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素数分布规律的发现(Ⅱ)以及黎曼猜想的直接证明
——黎曼猜想的复数几何法证明(3)

The Discovery of the Law of the Distribution of Prime Numbers (III) and the Direct Proof of the Riemann Conjecture
-- -Complex Geometric Proof of Riemann Conjecture (3)

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摘要：黎曼猜想有二层含义：一是指黎曼对素数在自然数的分布规律的有关假设和推测。用语言文字描述，即素数规律所包含的信息都在实部 x=1 /2 的这条直线上。不限具体的数学表示形式。二是指黎曼猜想的具体的数学表达形式，给出了黎曼ξ函数。也就是说，存在与素数分布有关的复数 s＝σ＋it，使得所有非平凡零点都在实部σ＝1/2 的直线上。为此，本文作者基于素数通项公式的首先发现，并利用该公式直接、巧妙地证明了黎曼假设的素数所有信息都在实部等于 1/2 的直线上。因此，推断黎曼猜想成立。

Abstract: Riemann Conjecture has two meanings: First, it refers to Riemann Hypothesis and speculation about the distribution law of prime numbers in natural numbers. To put it into words, the law of prime numbers contains all the information on this line with the real part x = 1/2. Not limited to specific mathematical representations. The second refers to the concrete mathematical

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expression of Riemann Conjecture, and gives the Riemann zeta function. That is, there are complex numbers$s = \sigma + it$, related to the distribution of prime numbers such that all nontrivial zeros are on a line with the real part $\sigma = 1/2$. Therefore, based on the first discovery of the general term formula of prime numbers, the author of this paper directly and skillfully proves that all the information of Riemann's assumption of prime numbers is on the line with the real part equal to 1/2. Therefore, we conclude that the Riemann Conjecture is true.

关键词:素数分布规律,素数通项公式,黎曼猜想,直接初等证明。

Key words: Distribution of prime numbers, Prime number general term formula, Riemann Conjecture, Direct elementary proof.

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§5 黎曼猜想的直接证明。

§5 Direct proof of the Riemann Conjecture.

首先依据作者研究，黎曼猜想应当有二层含义：一是包括黎曼有关对素数在自然数的分布规律的假设和推测。用语言文字描述表述，即素数规律信息都在实部 x＝1 /2 的垂直直线上。不限具体的数学表示形式。二是指黎曼猜想的具体的明确的数学表达形式，给出了黎曼ζ函数，并且提出满足黎曼ζ函数所有非凡零点都分布在实部等于 1/2 的直线上。

据此，这里我们给出任意有序素数在复平面内的平行四边形分解和黎曼猜想的复数几何直接证明的 3 种方法如下。

Firstly, according to the author's research, Riemann conjecture should have two meanings: First, it includes Riemann's hypothesis and speculation about the distribution law of prime numbers in natural numbers. Use language to describe the expression, that is, the prime number rule information is on the vertical line of the real part x = 1/2. Not limited to specific mathematical representations. The second refers to the concrete and explicit mathematical expression of the Riemann conjecture, giving the Riemann zeta function, and proposing that all the extraordinary zeros of the Riemann zeta function are distributed on the line with the real part equal to 1/2.

Accordingly, here we give the following three methods for the parallelogram decomposition of any ordered prime number in the complex plane and the direct geometric proof of the complex number of the Riemann conjecture.

证明 1. Proof 1.

根据有序素数的的分段定义方程定理 9，所有有序素数均分布在实部等于 1 的直线上，则所有素数从 1 到P_m，可用复数的指数形式表示为：

According to Theorem 9 of the piecewise definition of ordered primes, all ordered primes are distributed on a line with the real part equal to 1, then all primes from 1 to P_m can be expressed in the exponential form of the complex number:

$$Z = r_m e^{i\theta_m} \tag{5.1}$$

其中，Among them, $r_m = \sqrt{1 + {P_m}^2}, \theta_m = arctanP_m.$

式中：Z 为第 m 个有序素数P_m对应的高斯整数。r_m为高斯整数 Z 的模，θ_m为高斯整数 Z 的幅角，m 为有序素数的序数，e 为自然数，i 为虚数单位，m∈N^*。如图 14 所示。

Where: Z is the Gaussian integer corresponding to the m-th ordered prime number P_m. r_m is the module of a Gaussian integer Z, θ_m is the amplitude of a Gaussian integer Z, m is the ordinal of an ordered prime number, e is a natural number, i is an imaginary unit, m∈N^*. As shown in Figure 14.

因此，所有有序素数：1，2，3，5，7，11，13，17，⋯，BBP_m，⋯,依次可用复数指数形式表示为：

Thus, all ordered prime numbers: 1,2,3,5,7,11,13,17,...,P_m,... In turn can be expressed in the plural exponential form as:

$$\mathrm{Z}_1 = \mathrm{r}_1 e^{i\theta_1} \tag{5.2}$$

$$\mathrm{Z}_2 = \mathrm{r}_2 e^{i\theta_2} \tag{5.3}$$

$$\mathrm{Z}_3 = \mathrm{r}_3 e^{i\theta_3} \tag{5.4}$$

……

$$\mathrm{Z}_{\mathrm{m}-1} = \mathrm{r}_{\mathrm{m}-1} e^{i\theta_{m-1}} \tag{5.5}$$

$$\mathrm{Z} = \mathrm{r}_{\mathrm{m}} e^{i\theta_m} \tag{5.6}$$

……

分别将两个相邻的复数前一个除以后一个，即Z_1除以Z_2，Z_2除以Z_3，Z_3除以Z_4，…，$\mathrm{Z}_{\mathrm{m}-1}$除以 Z，依此类推，则得

Divide the previous one of two adjacent complex numbers into the next one, that is, Z_1 divided by Z_2, Z_2 divided by Z_3, Z_3 divided by Z_4,... Divide $\mathrm{Z}_{\mathrm{m}-1}$ by Z , and so on, we get

$$\frac{Z_2}{Z_1} = \frac{r_2}{r_1} e^{i(\theta_2-\theta_1)} \tag{5.7}$$

$$\frac{Z_3}{Z_2} = \frac{r_3}{r_2} e^{i(\theta_3-\theta_2)} \tag{5.8}$$

$$\frac{Z_4}{Z_3} = \frac{r_4}{r_3} e^{i(\theta_4-\theta_3)} \tag{5.9}$$

……

$$\frac{Z_{m-1}}{Z_{m-2}} = \frac{r_{m-1}}{r_{m-2}} e^{i(\theta_{m-1}-\theta_{m-2})} \tag{5.10}$$

$$\frac{Z}{Z_{m-1}} = \frac{r_m}{r_{m-1}} e^{i(\theta_m-\theta_{m-1})} \tag{5.11}$$

现将以上各式左右两边分别连乘，则得，

Now the left and right sides of the above are combined, and we get

$$\frac{Z}{Z_1} = \frac{r_m}{r_1} e^{i(\theta_m-\theta_1)} \tag{5.12}$$

根据有序素数分段定义方程定理 9，则第一个有序素数的高斯整数表示为：

According to Theorem 9 of the piecewise definition of equations for ordered prime numbers, then the Gaussian integer of the first ordered prime number is expressed as:

$$z_1 = 1 + \mathrm{i}P_1 \tag{5.13}$$

式中，有序素数P_1＝1。In the formula, ordered prime number P_1 = 1.

所以，我们可得到 So, we get $r_1 = \sqrt{2},\ \theta_1 = \pi/4.$

以上第一个有序素数也可以用指数式表示为：

The first ordered prime number above can also be expressed as an exponential:

$$Z_1 = \sqrt{2}e^{i\frac{\pi}{4}} \tag{5.14}$$

其次，再根据有序素数分段定义方程定理 9，则第 m 个有序素数的高斯整数表示为：

Secondly, the equation theorem 9 is defined piecewise according to the ordered prime number, then the Gaussian integer of the MTH ordered prime number is expressed as:

$$Z = 1+iP_m \tag{5.15}$$

分别将 Z＝1＋iP_m和Z_1＝1＋iP_1代入上式(5.12)，则有

Substituting Z= 1+iP_m and Z_1= 1+iP_1 into the above equation (5.12), respectively, gives

$$\frac{1+iP_m}{1+i} = \frac{r_m}{r_1}e^{i(\theta_m-\theta_1)} \tag{5.16}$$

上式(5.16)左边的分子和分母同时乘上(1－i)，得

The numerator and denominator on the left side of (5.16) are multiplied by (1-i) to get

$$\frac{(1+iP_m)(1-i)}{(1+i)(1-i)} = \frac{r_m}{\sqrt{2}}e^{i(\theta_m-\frac{\pi}{4})} \tag{5.17}$$

整理上式(5.17)，可得

Arrange the above formula (5.17), can be obtained

$$\frac{1}{2}+i\frac{P_m}{2} = \frac{r_m}{\sqrt{2}}e^{i(\theta_m-\frac{\pi}{4})}\frac{1}{(1-i)} \tag{5.18}$$

$$\frac{1}{2}+i\frac{P_m}{2} = (1+i)\frac{r_m}{2\sqrt{2}}e^{i(\theta_m-\frac{\pi}{4})} \tag{5.19}$$

即得， Get it,

$$\frac{1}{2}+i\frac{P_m}{2} = \sqrt{2}e^{i\frac{\pi}{4}}\frac{r_m/2}{\sqrt{2}}e^{i(\theta_m-\frac{\pi}{4})} \tag{5.20}$$

或者 Or

$$\frac{1}{2}+i\frac{P_m}{2} = \frac{r_m}{2}e^{i\theta_m} \tag{5.21}$$

若以 Z'表示复数 Z 对应向量$\overrightarrow{OZ}$的中心点 G，则得复数 Z 的中心点 G 的复数为：

If Z' represents the center point G of the vector $\overrightarrow{OZ}$ corresponding to the complex number Z, then the complex number of the center point G of the complex number Z is

$$Z' = \frac{1}{2}+i\frac{1}{2}P_m \tag{5.22}$$

则有 Then there is

$$Z' = \sqrt{2}e^{i\frac{\pi}{4}}\frac{r_m/2}{\sqrt{2}}e^{i(\theta_m-\frac{\pi}{4})} \tag{5.23}$$

或者 Or

$$Z' = \frac{1}{2}Z \tag{5.24}$$

其中，以上式(5.24)为：

Where, the above formula (5.24) is

$$Z = r_m e^{i\theta_m} \tag{5.25}$$

第三，根据素数通项公式定理 1，上式(5.24)也可表示为：

Third, according to the prime number general term formula theorem 1, the above equation (5.24) can also be expressed as:

$$Z' = \frac{1}{2} + i\frac{m + S_m}{2} \tag{5.26}$$

整理得　Sorted to

$$2Z' = (\frac{1}{2} + im) + (\frac{1}{2} + iS_m) \tag{5.27}$$

若令　If the

$$Z_1 = \frac{1}{2} + im，Z_2 = \frac{1}{2} + iS_m \tag{5.28}$$

又由于　And because of

$$Z' = \frac{1}{2}Z \tag{5.29}$$

分别将复数Z_1和Z_2代入式(5.27)，得

Substituting the complex numbers Z_1 and Z_2 into the formula (5.27), respectively, gives

$$Z = Z_1 + Z_2 \tag{5.30}$$

即任意一个素数复数可表示为两个实部为 1/2 的复数之和。根据复数加法的几何意义并构成一个平行四边形。其中：Z_1的实部为 1/2，虚部为素数序数 m；Z_2的实部为 1/2，虚部为前 m 项级数S_m。如图 14 所示。

That is, any prime complex number can be expressed as the sum of two complex numbers whose real part is 1/2. According to the geometric meaning of addition of complex numbers and form a parallelogram. Where: the real part of Z_1 is 1/2, and the imaginary part is the prime ordinal m; The real part of Z_2 is 1/2, and the imaginary part is the first m series S_m. As shown in Figure 14.

依据以上推导过程可知，所有素数通过以上解析延拓，它的信息都分布在实部等于 1 的直线 A 点与平面坐标系原点 O 连线的中点上。所以，我们可以得到黎曼 ζ 函数非平凡零点复数 s＝Z'， 即黎曼猜想所有的素数信息都在实部等于 1/2 的直线上。其非平凡零点 G 的复数 s 是：

According to the above derivation process, the information of all prime numbers is distributed on the midpoint of the line A with real part equal to 1 and the origin O of the plane coordinate system through the above analytic continuation. So, we can get the non-trivial zeros of the Riemann zeta function s = Z', that is, Riemann conjecture that all prime information is on a line with the real part equal to 1/2. The complex number s of its nontrivial zero G is:

$$s = Z' = \frac{1}{2}Z = \frac{1}{2} + i\frac{P_m}{2} \tag{5.31}$$

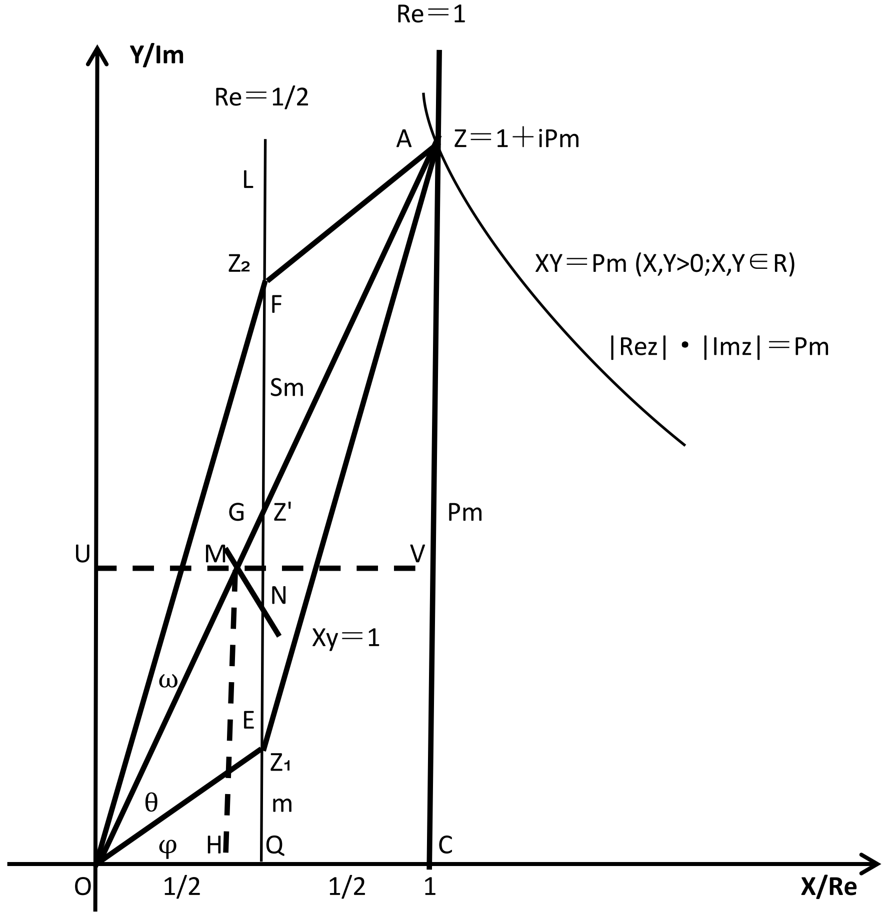

图 14：素数的平行四边形分解和黎曼猜想的复数几何证明方法示意图

Figure 14. Schematic diagram of the parallelogram decomposition of prime numbers and the complex geometric proof of Riemann conjecture

也就是说，自 1859 年黎曼发表了他一生唯一的一篇题为“论小于某一个给定自然数的素数个数”的数论论文中提出的黎曼 ζ 函数非平凡零点复数 s，即为：

In other words, since 1859, when Riemann published the only number theory paper of his life entitled "On the number of prime Numbers Less than a given natural number", he proposed that the Riemann Zeta function is a complex number of nontrivial zeros s, namely:

$$s = \sigma + it = \frac{1}{2} + i\frac{P_m}{2} \quad (5.32)$$

式中： $\sigma = \frac{1}{2}$,t=$\frac{1}{2}P_m$ 。P_m为第 m 个有序素数。因此，黎曼猜想的第一层含义得证。

In the formula: $\sigma=\frac{1}{2}$, t=$\frac{1}{2}P_m$. P_m is the m-th ordered prime number. Thus, the first meaning of the Riemann conjecture is proved. □

这里需要特别注意，依据以上推导过程可知，如果不是将自然单位数 1 排序为第一个素数，而是将素数 2 排序为第一个素数，则不能推导得到

It should be noted here that according to the above derivation process, if the natural unit number 1 is not sorted as the first prime number, but the prime number 2 is sorted as the first prime number, it cannot be deduced.

$$s = z' = \frac{1}{2} + i\frac{P_m}{2} \tag{5.33}$$

正因如此。这就是本研究论文作者将自然单位数 1 定义为第一个有序素数的重要原因。

That's why. This is an important reason why the authors of this paper define the natural unit number 1 as the first ordered prime number.

证明 2. 如图 14 所示。根据以上素数定义的方程，显然我们可以得到，在复平面内，任意一个以 1 为实部，以有序素数P_m为虚部的高斯整数 Z，可以表示为：

Proof 2. As shown in Figure 14. From the equation defined above for prime numbers, it is obvious that in the complex plane, any Gaussian integer Z with 1 as its real part and P_m as its imaginary part can be expressed as

$$Z = 1 + iP_m \tag{5.34}$$

其中：复数 Z 的实部为实数 1，虚部为普通素数P_m。

Where: The real part of the complex number Z_m is the real number 1 and the imaginary part is the ordinary prime number P_m.

将复数(5.34)分解为两个复数之和，则为：

Decompose the complex number (5.34) into the sum of two complex numbers, then:

$$Z = \left(\frac{1}{2} + im\right) + \left(\frac{1}{2} + iS_m\right) \tag{5.35}$$

若令 If the

$$Z_1 = \frac{1}{2} + im,\quad Z_2 = \frac{1}{2} + iS_m \tag{5.36}$$

分别将复数Z_1和Z_2代入式(5.35)，得

Substituting the complex numbers Z_1 and Z_2 into the formula (5.35), respectively, gives

$$Z = Z_1 + Z_2 \tag{5.37}$$

由此可见，Z_1和Z_2都是唯一的以 1/2 为实部的两个复数。其中，Z_1以有序素数的序数 m 为虚部，Z_2以有序素数前 m 项合数个数的级数之和S_m为虚部。

即任意一个素数复数可表示为两个实部为 1/2 的复数之和。根据复数加法的几何意义并构成一个平行四边形。如图 14 所示。其中：Z_1的实部为 1/2，虚部为素数序数 m；Z_2的实部为 1/2，虚部为前 m 项级数S_m。

Thus, Z_1 and Z_2 are the only two complex numbers with 1/2 as their real part. Where, Z_1 is the imaginary part of the ordinal m of the ordered prime number, and Z_2 is the imaginary part of the series sum of the composite number of the m terms before the ordered prime number S_m.

That is, any prime complex number can be expressed as the sum of two complex numbers whose real part is 1/2. According to the geometric meaning of addition of complex numbers and form a parallelogram. As shown in Figure 14. Where: the real part of Z_1 is 1/2, and the imaginary part is the prime ordinal m; The real part of Z_2 is 1/2, and the imaginary part is the first m series S_m.

又依据平行四边形ZZ_1OZ_2的对角线相互平分，则平行四边形两条对角线相互平分点 G 的复数为：

According to the diagonals of the parallelogram ZZ_1OZ_2 bisecting each other, then the complex number of the two diagonals of the parallelogram G bisecting each other is:

$$Z'=\frac{1}{2}Z=\frac{1}{2}(Z_1+Z_2) \tag{5.38}$$

即 That's

$$Z'=\frac{1}{2}+\frac{m+S_m}{2}i \tag{5.39}$$

或者 Or

$$Z'=\frac{1}{2}+i\frac{P_m}{2} \tag{5.40}$$

其中，m 为有序素数的序数，P_m为有序素数序列的通项。$S_m = S_m(P_m)$为有序素数序列的前 m 项所有间隔合数个数之和。它是有序素数的合数个数的特征无穷级数函数。$m \in N^*$。

Where m is the ordinal number of an ordered prime number and P_m is the general term of the sequence of ordered prime numbers. $S_m = S_m(P_m)$ is the sum of all the interval composite numbers of the first m terms of an ordered prime sequence. It is a characteristic infinite series function of the composite number of ordered prime numbers. $m \in N^*$.

因此，以上 Z'、Z_1和Z_2，这三个复数对应点。作者又称之为非平凡零点复数，它们都位于实部等于 1/2 的直线上，并构成任意一个有序素数分解为两个特定正整数的三个关键点。

Therefore, the above Z', Z_1 and Z_2, these three complex corresponding points. They are all located on a line with the real part equal to 1/2 and constitute three key points for the decomposition of any ordered prime number into two specific positive integers.

至此，可得出黎曼有关素数猜想的几何意义是：

Thus, the geometric meaning of Riemann's conjecture about prime numbers is as follows:

在复平面内任意一个形如 $Z=1+iP_m$的复数(其中虚部为有序素数P_m)，都可分解为三个非凡零点复数Z_1、Z_2 and Z'，并且实部都在等于 1/2 的直线上。这三个非凡零点复数分别是：

Any complex number in the complex plane of the form $Z=1+iP_m$ (where the imaginary part is the ordered prime P_m) can be decomposed into three extraordinary zeros complex numbers Z_1 、Z_2 and Z', all with real parts on a line equal to 1/2. These three extraordinary complex zeros are:

$$Z'=\frac{1}{2}+i\frac{P_m}{2} \tag{5.41}$$

$$Z_1=\frac{1}{2}+im, \qquad Z_2=\frac{1}{2}+iS_m \tag{5.42}$$

因此，黎曼猜想所有的素数信息都被证明在实部等于 1/2 的直线上成立。

Thus, the Riemann’s Conjecture proves that all prime information is true on a line where the real part is equal to 1/2.

也就是说，黎曼ζ函数非平凡零点复数 s，即为：

In other words, the Riemann zeta function is a complex number of nontrivial zeros s, which is

$$s = \sigma + it = \frac{1}{2} + i\frac{P_m}{2}$$

式中： $\sigma = \frac{1}{2}$,t=$\frac{1}{2}P_m$ 。P_m为第 m 个有序素数。

In formula: $\sigma = \frac{1}{2}$, t=$\frac{1}{2}P_m$. P_m is the m-th ordered prime number.

证明 3. 以上定理 2 的证明，实际上就给出了黎曼猜想几何方法更为简单、直接的证明。这里就不再重复论述。

Proof 3. The proof of theorem 2 above actually gives a simpler and more direct proof of the geometric method of the Riemann conjecture. We will not repeat the argument here.

因此，依据以上研究结果，我们就可以得到任意一个有序素数的三个非平凡零点的复数表示形式。这里作者给出前 15 个素数的非平凡零点复数。如表 5 所示。

Therefore, according to the above research results, we can get the complex representation of three nontrivial zeros of any ordered prime number. Here the author gives the complex number of nontrivial zeros for the first 15 prime numbers. As shown in Table 5.

表 5　前 15 个有序素数的相关变量和非平凡零点复数表

Table 5 Lists the related variables of the first 15 ordered prime numbers and the complex numbers of nontrivial zeros

序号 (m)	$S_m(P_m)$	素数 (P_m)	每个素数的三个非凡零点复数 Three extraordinary zeros complex numbers for each prime number	
1	0	1	$Z_1 = \frac{1}{2}$+1i，$Z_2 = \frac{1}{2}$+0i，$Z' = \frac{1}{2}$+0.5i	
2	0	2	$Z_1 = \frac{1}{2}$+2i，$Z_2 = \frac{1}{2}$+0i，$Z' = \frac{1}{2}$+1i	
3	0	3	$Z_1 = \frac{1}{2}$+3i，$Z_2 = \frac{1}{2}$+0i，$Z' = \frac{1}{2}$+1.5i	
4	1	5	$Z_1 = \frac{1}{2}$+4i，$Z_2 = \frac{1}{2}$+1i，$Z' = \frac{1}{2}$+2.5i	
5	2	7	$Z_1 = \frac{1}{2}$+5i，$Z_2 = \frac{1}{2}$+2i，$Z' = \frac{1}{2}$+3.5i	
6	5	11	$Z_1 = \frac{1}{2}$+6i，$Z_2 = \frac{1}{2}$+5i，$Z' = \frac{1}{2}$+5.5i	
7	6	13	$Z_1 = \frac{1}{2}$+7i，$Z_2 = \frac{1}{2}$+6i，$Z' = \frac{1}{2}$+6.5i	
8	9	17	$Z_1 = \frac{1}{2}$+8i，$Z_2 = \frac{1}{2}$+9i，$Z' = \frac{1}{2}$+8.5i	
9	10	19	$Z_1 = \frac{1}{2}$+9i，$Z_2 = \frac{1}{2}$+10i，$Z' = \frac{1}{2}$+9.5i	

10	13	23	$Z_1=\frac{1}{2}$+10i，$Z_2=\frac{1}{2}$+13i，$Z'=\frac{1}{2}$+11.5i	
11	18	29	$Z_1=\frac{1}{2}$+11i，$Z_2=\frac{1}{2}$+18i，$Z'=\frac{1}{2}$+14.5i	
12	19	31	$Z_1=\frac{1}{2}$+12i，$Z_2=\frac{1}{2}$+19i，$Z'=\frac{1}{2}$+15.5i	
13	24	37	$Z_1=\frac{1}{2}$+13i，$Z_2=\frac{1}{2}$+24i，$Z'=\frac{1}{2}$+18.5i	
14	27	41	$Z_1=\frac{1}{2}$+14i，$Z_2=\frac{1}{2}$+27i，$Z'=\frac{1}{2}$+20.5i	
15	28	43	$Z_1=\frac{1}{2}$+15i，$Z_2=\frac{1}{2}$+28i，$Z'=\frac{1}{2}$+21.5i	

由上表 5 可见，每个素数均有三个非平凡零点复数，其中Z_1和Z_2虚部是正整数，Z'的虚部是 1(mod2)的正整数。同理，根据有序素数三个非凡零点Z_1、Z_2和 Z'的复数表达式，对于给定任意一个有序素数的序数 m 和前 Sm 个素数合数个数和，我们就都可以写出任意一个有序素数的三个非平凡零点复数表达式。

As can be seen from Table 5 above, every prime number has three nontrivial zero-point complex numbers, where Z_1 and Z_2 imaginary part is a positive integer and Z' imaginary part is a positive integer of 1(mod2). In the same way, according to the complex expression of the three extraordinary zeros Z_1、Z_2 and Z' of the ordered prime number, we can write the complex expression of the three nontrivial zeros of any ordered prime number given the sum of the ordinal m and the first Sm primes.

更多有序素数相关的非平凡零点复数，详见表 7 所示。

For more nontrivial zeros complex numbers related to ordered primes, see Table 7.

显然，根据以上结果，我们可推得：

Obviously, according to the above results, we can deduce that:

推论 1. 非平凡零点复数Z_1、Z_2的实部是 1/2，而虚部分别是有序素数P_m的序数 m 和前 m 项合数个数的和S_m，则 m 和S_m必然是正整数。

Corollary 1. If the real part of Z_1、Z_2 is 1/2, and the imaginary part is the sum S_m of the ordinal m of the ordered prime P_m and the composite number of the preceding m terms, then m and S_m must be positive integers.

本推论依据 m 和S_m的定义就可以得到证明。

This inference can be proved by the definition of m and S_m.

推论 2. m，S_m分别是有序素数P_m的序数 m 和前 m 项合数个数的和S_m，则有

Corollary 2. m, S_m is the sum S_m of the ordinal m and the composite number of the preceding m terms of the ordered prime P_m, then

$$m+S_m \equiv 1(\text{mod}2).$$

本推论根据有序素数通项公式定理 1，可以得到证明。至此，我们可以得到以下结论：

This inference can be proved according to theorem 1 of the general term formula for ordered prime numbers. At this point, we can draw the following conclusions:

根据素数定义方程可知，任意一个有序素数在复平面内都在 X＝1 的直线上，并可以分解为一个平行四边形，如图 OZ_1ZZ_2所示。其中较长的对角线是$|OZ|$，较短的对角线是$|Z_1Z_2|$， G 是两条对角线的交点。三个非凡零点复数Z_1、Z_2 和 Z'，都在较短的对角线上，也就是在实部等于 1/2 的直线上。所以，黎曼猜想的第一层含义得证，即黎曼猜想成立。

According to the prime definition equation, it can be seen that any ordered prime number lies on the line X = 1 in the complex plane and can be decomposed into a parallelogram, as shown in Figure OZ_1ZZ_2 . The longer diagonal is |OZ|, the shorter diagonal is| Z_1Z_2 |, and G is the intersection of the two diagonal lines. The three extraordinary zeros, Z_1、Z_2 and Z', are all on the shorter diagonal, that is, on the line where the real part is equal to 1/2.

但是，自 1859 年，黎曼提出黎曼猜想至今，数学界普遍认为，黎曼ζ函数的零点分布与素数的分布有关。为此，作者推测与素数相关的量，一是素数本身数量，二是与素数相联系的序数。这些相关变量应当都是正整数或者是模 2 余 1 的正整数(≡1mod2)。并且都分布在实部等于 1/2 的直线上。

However, since 1859, when Riemann proposed the Riemann conjecture, the mathematical community has generally believed that the distribution of zeros of the Riemann zeta function is related to the distribution of prime numbers. For this reason, the authors speculate that the quantity related to prime numbers is the number of prime numbers themselves, and the Ordinal Numbers associated with prime numbers. These variables should be positive integers or positive integers of mod2 + 1 (≡1mod2). And they're all distributed on lines where the real part is equal to 1/2.

依据本论文作者的以上研究结果，我们可以得到黎曼ζ函数的非平凡零点就是有序素数的定义直线实部等于 1 上的点 A 与坐标系原点连线的中点 G，即是有序素数进行平行四边形分解的两条对角线交点，该点均位于实部等于 1/2 直线上，它对应的复数是 Z'。也就是黎曼ζ函数的非平凡零点的复数 s 为：

According to the above research results of the authors of this paper, we can get that the non-trivial zero of the Riemann zeta function is the definition of the ordered prime number. The real part of the line is equal to the point A on 1 and the center point G of the coordinate system origin line, that is, the intersection of two diagonal lines of the ordered prime number for parallelateral decomposition, which is located on the line with the real part equal to 1/2, and its corresponding complex number is Z'. The complex number s of the nontrivial zeros of the Riemann zeta function is

$$s = \delta + it = Z' = \frac{1}{2} + i\frac{P_m}{2} \tag{5.43}$$

为了书写方便，以上第 m 个有序素数P_m表示为 P。m∈N^*。因此，上式(5.43)也可表示为：

For ease of writing, the m th ordered prime number P_m above is denoted as P. m∈ N^*. Therefore, the above equation (5.44) can also be expressed as:

$$s = \frac{1}{2} + i\frac{P}{2} \tag{5.44}$$

所以，黎曼ζ函数非平凡零点复数 s 的两个参数δ和 t，分别是 t=$\frac{1}{2}P$，δ = $\frac{1}{2}$，P 为第 m 个有序素数 Pm。

Therefore, the two parameters δ and t of the Riemann zeta function are t=$\frac{1}{2}$, $\delta = \frac{1}{2}$ and P is the m-th ordered prime Pm.

现在我们以 s＝Z'来验证原始黎曼ζ函数：

Now we verify the original Riemann-zeta function with s = Z' :

$$\zeta(s)=\prod_{p}\left(1-\frac{1}{p^{s}}\right)^{-1}=\sum_{n}\frac{1}{n^{s}} \tag{5.45}$$

它是成立的。It is true.
其中，依据以上黎曼猜想的ζ函数数学表达式，当素数 P＝1 时，则有
Among them, according to the mathematical expression of the zeta function of the Riemann conjecture above, when the prime number P = 1, there is

$$1-\frac{1}{p^{s}}=0$$

以上黎曼猜想的ζ函数数学表达式没有意义。因此，以下有关素数 P 均从本文定义第 2 个素数开始依次为P_2，P_3，P_4，⋯，P_m，⋯，并且分别等于：2，3，5，7，11，13，⋯，Pm，⋯。这里 m≠1，m∈N^*。下面我们来分析上式(5.45)黎曼ζ函数所包含的几何意义。
The above mathematical expression for the zeta function of the Riemann conjecture does not make sense. Therefore, the following related prime numbers P, starting from the second prime number defined in this paper, are successivel $P_2, P_3, P_4, \cdots, P_m, \cdots$, and equal to: 2,3,5,7,11,13,... ... Pm... . Here m≠1, m∈N^*. Let us now analyze the geometric implications of the Riemann zeta function of equation (5.45) above.

首先，我们将黎曼ζ函数的非平凡零点 G 复数：

First, we take the complex number G of the nontrivial zeros of the Riemann zeta function:

$$s=Z'=\frac{1}{2}+i\frac{P}{2} \tag{5.46}$$

以上式(5.46)代入最初的黎曼ζ函数，即
The above equation (5.46) is substituted into the original Riemann zeta function, which is

$$\zeta(s)=\prod_{p}^{\infty}\left(1-\frac{1}{p^{s}}\right)^{-1}=\sum_{n}^{\infty}\frac{1}{n^{s}}$$

则有　We have

$$\zeta(s)=\prod_{p}^{\infty}\left(1-\frac{1}{p^{\frac{1}{2}+i\frac{p}{2}}}\right)^{-1}=\sum_{n}^{\infty}\frac{1}{n^{\frac{1}{2}+i\frac{p}{2}}}$$

并整理，则有：　After sorting, there is:

$$\zeta(s)=\prod_{p}^{\infty}\left(\frac{1}{1-\frac{1}{\sqrt{P}}e^{-i\frac{p}{2}lnp}}\right)=\sum_{n}^{\infty}\frac{1}{\sqrt{n}}e^{-i\frac{p}{2}lnn} \tag{5.47}$$

也可以表示为：　Can also be expressed as:

$$\frac{1}{\prod_{p=2}^{\infty}\left(1-\frac{1}{\sqrt{P}}e^{-i\frac{p}{2}lnp}\right)}=\zeta(s)=\sum_{n}^{\infty}\frac{1}{\sqrt{n}}e^{-i\frac{p}{2}lnn} \tag{5.48}$$

其次，上式(5.48)中的分母部分，即

Second, the denominator part in the above equation (5.48) is

$$\prod_{p=2}^{\infty}\left(1-\frac{1}{\sqrt{P}}e^{-i\frac{p}{2}lnp}\right) \tag{5.49}$$

当中的自然单位数 1 可表示为两个共轭复数的和，即 1＝(1/2＋i)＋(1/2－i)。这是黎曼 ζ 函数的所有非平凡零点都在实部等于 1/2 的关键性分解。因此，原始黎曼 ζ 函数可表示为：

The natural unit number 1 can be expressed as the sum of two conjugate complex numbers, i.e. 1 = (1/2+i)+(1/2-i). This is a critical decomposition in which all nontrivial zeros of the Riemann zeta function are equal to 1/2 in the real part. Thus, the original Riemann zeta function can be expressed as:

$$\frac{1}{\prod_{p=2}^{\infty}\left((\frac{1}{2}+i)+(\frac{1}{2}-i)-\frac{1}{\sqrt{p}}e^{-i\frac{p}{2}lnp}\right)}$$

$$=\zeta(s)=1+\frac{1}{\sqrt{2}}e^{-i\frac{p}{2}ln2}+\frac{1}{\sqrt{3}}e^{-i\frac{p}{2}ln3}+\cdots+\frac{1}{\sqrt{n}}e^{-i\frac{p}{2}lnn} \tag{5.50}$$

下面我们依据上式(5.50)的复数表示形式，并给出黎曼黎曼 ζ 函数的几何意义。如图 15 和 16 所示。推出黎曼 ζ 函数的等价方程定理 12。

In the following, we give the geometric meaning of the Riemann Riemann zeta function based on the complex representation of the above equation (5.50). See Figures 15 and 16. Derive the equivalent equation theorem for the Riemann zeta function 12.

定理 12。黎曼 ζ 函数的等价方程是(5.51)：

Theorem 12. The equivalent equation for the Riemann zeta function is (5.51) :

$$\zeta(s)=\prod_{P=2}^{\infty}\frac{1}{1-\frac{1}{P^s}}=\prod_{1}^{n}(\frac{1}{\sqrt{P}}\times\sqrt{n}\times\sqrt{P}\times\frac{1}{\sqrt{n}})\ \sum\frac{1}{n^s}\ \prod_{p=2}^{\infty}\frac{(1+\frac{1}{P^s})}{(1+\frac{1}{P^s})}\prod_{p=2}^{\infty}\frac{\sqrt{1+P^{2s}}}{\sqrt{1+P^{2s}}} \tag{5.51}$$

或者将它简化表示为(5.52)：

Or simply express it as (5.52) :

$$\zeta(s)=(xy)=1\times\sqrt{P}\times\frac{1}{\sqrt{n}}\times\frac{1}{\sqrt{P}}\times\sqrt{n}=1 \tag{5.52}$$

式中，x、y≠0；x、y∈R。只有当自然数 n 是素数 P 时，上式方可成立。

In the formula, x and y≠0; x and y∈R. The above formula is true only if the natural number n is prime P.

证明。Proof .

首先作图，如图 15 所示。在平面内，直线 L 是任意等轴双曲线方程 xy＝C (x,y,c>0;x,y,c∈R)的一条对称轴直线。l 是在实平面内 X 轴等于 1/2 或者复平面内实部等于 1/2 的一条垂直线。直线 L_1 是任意一个素数在实平面内 X 轴等于 1 或者复平面内实部等于 1 的定义直线。

A 点是任意一个素数的定义等轴双曲线 xy＝Pm (x,y>0;x,y∈R)与定义直线的相交点。连接 A 点与实平面或者复平面坐标系原点 O，则得线段 AO 与直线 l 相交点为 G，与等轴曲线 xy＝1 (x,y>0;x,y∈R)相交点为 M。直线 l 与等轴曲线 xy＝1 相交点为 N。现过 M 点作 X 轴平行线 UV 和 Y 轴垂线 MH，则有 x＝UM＝OH；y＝OU＝MH。

Start with a diagram, as shown in Figure 15. In the plane, the line L is any equiaxial hyperbolic equation xy = C (x,y,c>0; x,y,c∈R) is a line of symmetry. l is a vertical line in the real plane where the X-axis is equal to 1/2 or in the complex plane where the real part is equal to 1/2. The straight line L_1 is a defined straight line of any prime number in the real plane with the X-axis equal to 1 or in the complex plane with the real part equal to 1. Point A is the definition of any prime number and the isoaxial hyperbola xy = Pm (x,y>0; The point at which x,y∈R) intersects the defined line. Connect point A to the origin O of the real plane or complex plane coordinate system, then the intersection point of line segment AO and line l is G, and the equiaxial curve xy = 1 (x,y>0; x,y∈R) intersects at M. The point at which the line l intersects the equiaxial curve xy = 1 is N. Now point M is the X-axis parallel line UV and the Y-axis perpendicular line MH, then x = UM = OH; y = OU = MH.

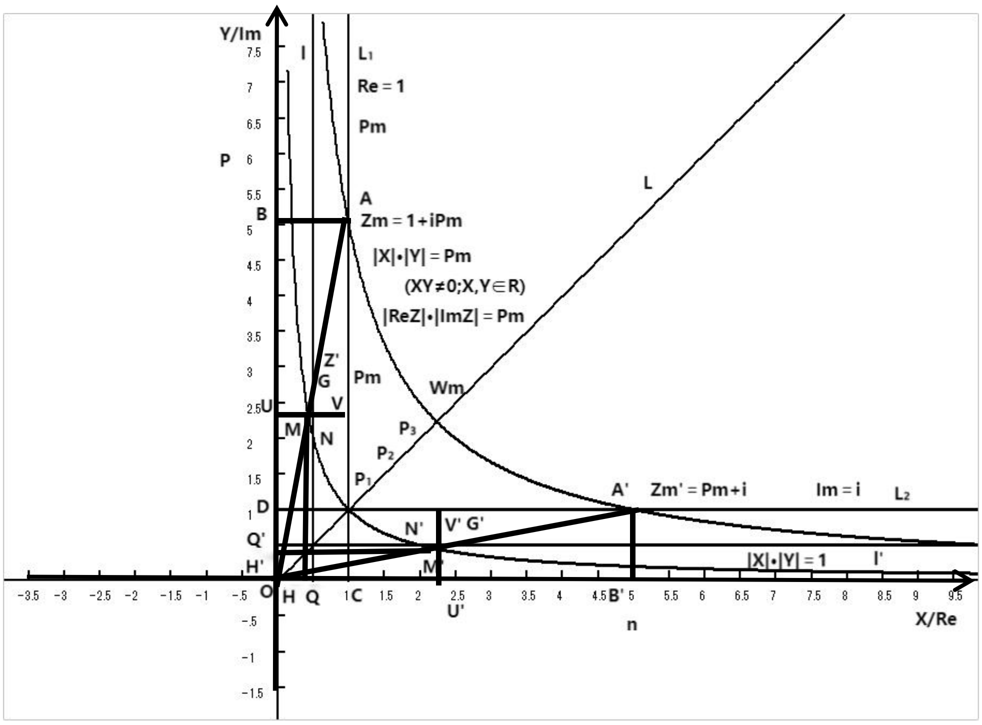

图 15. 素数分段方程曲线的复数几何解析示意图

Figure 15. Complex geometric analysis diagram of prime piecewise equation curve

由于 M 点为等轴双曲线 xy＝1，与经过坐标系原点 O，并且斜率为素数 P 的直线 y＝px 的相交点。我们通过求解由前面两个方程 xy＝1 和 y＝Px 构成的联立方程组，则可得 M 点的坐标值为：

Since point M is an equiaxial hyperbola xy = 1, it intersects a line y = px that passes through the origin O of the coordinate system and has a slope of prime P. By solving the simultaneous equations consisting of the previous two equations xy = 1 and y = Px, the coordinate value of point M can be obtained as:

$$px^2 = 1 \tag{5.53}$$

$$OH = x = \frac{1}{\sqrt{p}}$$

$$MH = y = \sqrt{P}$$

即得， That's it,

$$OH = x = \frac{1}{\sqrt{P}}, \; MH = y = \sqrt{P}$$

因为任意等轴双曲线均是以 L 直线 y＝x 为对称轴的双曲线。因此，则得曲边三角形面积 AOW_m等于曲边三角形面积 A'OW_m；曲边三角形面积 MOP_1等于曲边三角形面积 M'OP_1。△AOC≌△A'OD；△AMV≌△A'M'V'；△MOH≌△M'OH'。则有 OA＝OA'；OB＝AC＝A'D＝OB'。

Because any equiaxial hyperbola is a hyperbola with L line y = x as the axis of symmetry. Therefore, the area of the curved triangle AOW_m is equal to the area of the curved triangle A'OW_m; The area MOP_1 of a curved triangle is equal to the area M'OP_1 of a curved triangle. △AOC≌△A'OD; △AMV≌△A M 'v '; △MOH≌△M'OH'. OA = OA'; OB = AC = A'd = OB'.

对于虚轴方向上或 Y 坐标轴方向上的所有有序素数 P，因为△AOC∽△AMV∽△MOH，则有相似三角形对应边成比例。可得：

For all ordered prime numbers P in the direction of the imaginary axis or the direction of the Y axis, there are similar triangles proportional to the corresponding sides because of △AOC∽△AMV∽△MOH. Available:

$$\frac{MH}{OH} = \frac{AV}{MV} = \frac{AC}{OC} \tag{5.54}$$

$$\frac{MO}{MH} = \frac{AM}{AV} = \frac{AO}{OC} \tag{5.55}$$

$$\frac{MO}{OH} = \frac{AM}{MV} = \frac{AO}{OC} \tag{5.56}$$

首先依据比例恒等式(5.54)：

First, according to the proportional identity (5.54) :

$$\frac{MH}{OH} = \frac{AV}{MV} = \frac{AC}{OC}$$

则有恒等式 We have the identity

$$\frac{\sqrt{P}}{\frac{1}{\sqrt{P}}} = \frac{P - \sqrt{P}}{1 - \frac{1}{\sqrt{P}}} = \frac{P}{1} \tag{5.57}$$

即得

$$\sqrt{P} = \frac{P-\sqrt{P}}{\sqrt{P}} \times \frac{1}{1-\frac{1}{\sqrt{P}}} = \sqrt{P} \tag{5.58}$$

is obtained

由于$y=\sqrt{P}$，所以，即有恒等式

Since $y=\sqrt{P}$, we have the identity

$$y = \sqrt{P} = \frac{P-\sqrt{P}}{\sqrt{P}} \times \frac{1}{1-\frac{1}{\sqrt{P}}} = \sqrt{P} = y \tag{5.59}$$

又依据比例恒等式(5.55)

Based on the proportional identity (5.55)

$$\frac{\mathrm{MO}}{\mathrm{MH'}} = \frac{\mathrm{AM}}{\mathrm{AV}} = \frac{\mathrm{AO}}{\mathrm{AC}}$$

则有恒等式　We have the identity

$$\frac{\sqrt{P+\frac{1}{P}}}{\sqrt{P}} = \frac{\sqrt{(1-\frac{1}{\sqrt{P}})^2 + (P-\sqrt{P})^2}}{P-\sqrt{P}} = \frac{\sqrt{1+P^2}}{P} \tag{5.60}$$

$$\frac{\sqrt{1+P^2}}{\sqrt{P}} = \sqrt{P} \times \frac{\sqrt{(1-\frac{1}{\sqrt{P}})^2 + P^2(1-\frac{1}{\sqrt{P}})^2}}{P-\sqrt{P}} = \sqrt{P} \times \frac{\sqrt{1+P^2}}{P} \tag{5.61}$$

$$\frac{1}{\sqrt{P}} = \sqrt{P} \times \frac{(1-\frac{1}{\sqrt{P}})\sqrt{1+P^2}}{(P-\sqrt{P})\sqrt{1+P^2}} = \frac{1}{\sqrt{P}} \tag{5.62}$$

由于 $\mathrm{x} = \frac{1}{\sqrt{P}}$，所以，即有恒等式：

Since $\mathrm{x} = \frac{1}{\sqrt{P}}$, there is the identity:

$$\mathrm{x} = \frac{1}{\sqrt{P}} = (1-\frac{1}{\sqrt{P}}) \times \frac{\sqrt{P}\sqrt{1+P^2}}{(P-\sqrt{P})\sqrt{1+P^2}} = \frac{1}{\sqrt{P}} = x \tag{5.63}$$

或者 Or

$$\mathrm{x} = \frac{1}{\sqrt{P}} = (1-\frac{1}{\sqrt{P}}) \times \frac{\sqrt{P}}{(P-\sqrt{P})} = \frac{1}{\sqrt{P}} = x \tag{5.64}$$

再依据比例恒等式(5.56)

Then according to the proportional identity (5.56)

$$\frac{\mathrm{MO}}{\mathrm{OH}} = \frac{\mathrm{AM}}{\mathrm{MV}} = \frac{\mathrm{AO}}{\mathrm{OC}}$$

则有恒等式　We have the identity

$$\frac{\sqrt{P+\frac{1}{P}}}{\frac{1}{\sqrt{P}}}=\frac{\sqrt{(1-\frac{1}{\sqrt{P}})^2+(P-\sqrt{P})^2}}{1-\frac{1}{\sqrt{P}}}=\frac{\sqrt{1+P^2}}{1} \quad (5.65)$$

$$\sqrt{P+\frac{1}{P}}=\frac{1}{\sqrt{P}}\times\frac{\sqrt{(1-\frac{1}{\sqrt{P}})^2+P^2(1-\frac{1}{\sqrt{P}})^2}}{1-\frac{1}{\sqrt{P}}}=\frac{1}{\sqrt{P}}\times\frac{\sqrt{1+P^2}}{1} \quad (5.66)$$

$$\frac{1}{\sqrt{P}}\times\sqrt{P}=\frac{1}{\sqrt{P}}\times\sqrt{P}\times\frac{\sqrt{1+P^2}}{\sqrt{1+P^2}}\times(1-\frac{1}{\sqrt{P}})\times\frac{1}{1-\frac{1}{\sqrt{P}}}=\frac{1}{\sqrt{P}}\times\sqrt{P} \quad (5.67)$$

由于 $x=\frac{1}{\sqrt{P}}$，$y=\sqrt{P}$，所以，即有恒等式

Since $x=\frac{1}{\sqrt{P}}, y=\sqrt{P}$, we have the identity

$$1=xy=\frac{1}{\sqrt{P}}\times\sqrt{P}=\frac{1}{\sqrt{P}}\times\sqrt{P}\times\frac{\sqrt{1+P^2}}{\sqrt{1+P^2}}\times(1-\frac{1}{\sqrt{P}})\times\frac{1}{1-\frac{1}{\sqrt{P}}}=\sqrt{P}\times\frac{1}{\sqrt{P}}=yx=1 \quad (5.68)$$

以上结果我们也可以将以上 x 和 y 两个恒等式的表达式相乘，即：
We can also multiply the expressions of the two identities x and y above, namely:

$$x=\frac{1}{\sqrt{P}}=(1-\frac{1}{\sqrt{P}})\times\frac{\sqrt{P}\sqrt{1+P^2}}{(P-\sqrt{P})\sqrt{1+P^2}}=\frac{1}{\sqrt{P}}=x \quad (5.69)$$

和　And

$$y=\sqrt{P}=\frac{P-\sqrt{P}}{\sqrt{P}}\times\frac{1}{1-\frac{1}{\sqrt{P}}}=\sqrt{P}=y \quad (5.70)$$

将以上两式(5.69)和(5.70)相乘得到式(5.71)
Multiply the above two formulas (5.69) and (5.70) to get the formula (5.71)

$$yx=\sqrt{P}\times\frac{1}{\sqrt{P}}=(1-\frac{1}{\sqrt{P}})\times\frac{\sqrt{P}\sqrt{1+P^2}}{(P-\sqrt{P})\sqrt{1+P^2}}\times\frac{P-\sqrt{P}}{\sqrt{P}}\times\frac{1}{1-\frac{1}{\sqrt{P}}}=\frac{1}{\sqrt{P}}\times\sqrt{P}=xy \quad (5.71)$$

$$yx=\sqrt{P}\times\frac{1}{\sqrt{P}}=(1-\frac{1}{\sqrt{P}})\times\frac{\sqrt{P}\sqrt{1+P^2}}{P(1-\frac{1}{\sqrt{P}})\sqrt{1+P^2}}\times\frac{P-\sqrt{P}}{\sqrt{P}}\times\frac{1}{1-\frac{1}{\sqrt{P}}}=\frac{1}{\sqrt{P}}\times\sqrt{P}=xy \quad (5.72)$$

$$1=xy=\frac{1}{\sqrt{P}}\times\sqrt{P}=\frac{(P-\sqrt{P})\sqrt{1+P^2}}{P\sqrt{1+P^2}}\times\frac{1}{1-\frac{1}{\sqrt{P}}}=\sqrt{P}\times\frac{1}{\sqrt{P}}=yx=1 \qquad (5.73)$$

以上结果(5.68)和(5.73)都是一致的。即为

The above results (5.68) and (5.73) are consistent. That's

$$\frac{(P-\sqrt{P})\sqrt{1+P^2}}{P\sqrt{1+P^2}}\times\frac{1}{1-\frac{1}{\sqrt{P}}}=yx \qquad (5.74)$$

若将上式(5.73)进一步简化，即得

If the above formula (5.73) is further simplified,

$$\frac{1}{1-\frac{1}{\sqrt{P}}}=yx\frac{P\sqrt{1+P^2}}{(P-\sqrt{P})\sqrt{1+P^2}} \qquad (5.75)$$

is obtained

或者 Or

$$\frac{\sqrt{P}\sqrt{1+P^2}}{(P-\sqrt{P})\sqrt{1+P^2}}\times\frac{P-\sqrt{P}}{\sqrt{P}}\times\frac{1}{1-\frac{1}{\sqrt{P}}}=xy\frac{1}{(1-\frac{1}{\sqrt{P}})} \qquad (5.76)$$

$$(\sqrt{1+P^2})\frac{\sqrt{P}}{(P-\sqrt{P})}\times\frac{(P-\sqrt{P})}{\sqrt{P}}\times\frac{1}{(1-\frac{1}{\sqrt{P}})}=(\sqrt{1+P^2})(xy)\frac{1}{(1-\frac{1}{\sqrt{P}})} \qquad (5.77)$$

$$(\sqrt{1+P^2})\times\frac{1}{(1-\frac{1}{\sqrt{P}})}=(\sqrt{1+P^2})(xy)\frac{1}{(1-\frac{1}{\sqrt{P}})}\times\frac{\sqrt{P}}{(P-\sqrt{P})}\times\frac{(P-\sqrt{P})}{\sqrt{P}} \qquad (5.78)$$

$$\frac{1}{(1-\frac{1}{\sqrt{P}})}=(xy)\frac{1}{(1-\frac{1}{\sqrt{P}})}\times\frac{\sqrt{1+P^2}}{\sqrt{1+P^2}}\times\frac{\sqrt{P}}{(P-\sqrt{P})}\times\frac{1}{\frac{\sqrt{P}}{(P-\sqrt{P})}} \qquad (5.79)$$

将上式(5.79)两边同时乘上式：

Multiply both sides of the above equation (5.79) by:

$$\frac{1}{(1+\frac{1}{\sqrt{P}})}$$

即有 That's

$$\frac{1}{(1-\frac{1}{P})}=(xy)\frac{1}{(1-\frac{1}{\sqrt{P}})}\times\frac{1}{(1+\frac{1}{\sqrt{P}})}\times\frac{\sqrt{1+P^2}}{\sqrt{1+P^2}}\times\frac{\sqrt{P}}{(P-\sqrt{P})}\times\frac{1}{\frac{\sqrt{P}}{(P-\sqrt{P})}} \qquad (5.80)$$

整理上式(5.81)，则得，

Sorting out the above formula (5.81), we get,

$$\frac{1}{(1-\frac{1}{P})}=(xy)\frac{1}{(1-\frac{1}{P})}\times\frac{\sqrt{1+P^2}}{\sqrt{1+P^2}} \tag{5.81}$$

同理，再将上式(5.81)左右两边同时乘上恒等式：
By the same token, multiply the left and right sides of the above equation (5.81) by the identity:

$$1=\frac{1+\frac{1}{P}}{1+\frac{1}{P}}$$

即有 That's

$$\frac{1}{(1-\frac{1}{P})}=(xy)\frac{1}{(1-\frac{1}{P})}\times\frac{(1+\frac{1}{P})}{(1+\frac{1}{P})}\times\frac{\sqrt{1+P^2}}{\sqrt{1+P^2}} \tag{5.82}$$

上式(5.82)的几何意义是使得每一个素数都是独立镶嵌在等轴双曲线 xy＝1 上。这就是黎曼ζ函数的几何特征。如图 16 所示。
The geometric meaning of the above formula (5.82) is that each prime number is independently embedded on the equiaxial hyperbola xy = 1. This is the geometric property of the Riemann zeta function. As shown in Figure 16.

现依据黎曼ζ函数的定义，这里将式(5.82)中的素数进行解析延拓，即将它的指数 1 扩展为复数 s，这时我们就可以得到每一个素数解析延拓的黎曼ζ函数的数学表达式可变为：
According to the definition of the Riemann zeta function, here the prime number in the equation (5.82) is extended analytically, that is, its exponent 1 is extended to the complex number s, then we can get the mathematical expression of the Riemann zeta function of the analytic extension of every prime number can become:

$$\frac{1}{(1-\frac{1}{P^s})}=(xy)\frac{1}{(1-\frac{1}{P^s})}\times\frac{(1+\frac{1}{P^s})}{(1+\frac{1}{P^s})}\times\frac{\sqrt{1+P^{2s}}}{\sqrt{1+P^{2s}}} \tag{5.83}$$

现将上式(5.83)每个有序素数左右两边对应相乘，则得
Now multiply the left and right sides of each ordered prime number in the above equation (5.83), then

$$\prod_{\mathrm{P}=2}^{\infty}\frac{1}{1-\frac{1}{P^s}}=\prod_{\mathrm{n}=1}^{\infty}(xy)\frac{1}{(1-\frac{1}{P^s})}\prod_{\mathrm{p}=2}^{\infty}\frac{(1+\frac{1}{P^s})}{(1+\frac{1}{P^s})}\prod_{\mathrm{p}=2}^{\infty}\frac{\sqrt{1+P^{2s}}}{\sqrt{1+P^{2s}}} \tag{5.84}$$

因为黎曼ζ函数的定义为：
Because the definition of the Riemann zeta function is:

$$\zeta(s)=\prod_{\mathrm{P}=2}^{\infty}\frac{1}{1-\frac{1}{P^s}}=\sum\frac{1}{n^s} \tag{5.85}$$

则有 We have

$$\zeta(s)=\prod_{P=2}^{\infty}\frac{1}{1-\frac{1}{P^s}}=\prod_{n=1}^{\infty}(xy)\prod_{p=2}^{\infty}\frac{1}{(1-\frac{1}{P^s})}\prod_{p=2}^{\infty}\frac{(1+\frac{1}{P^s})}{(1+\frac{1}{P^s})}\prod_{p=2}^{\infty}\frac{\sqrt{1+P^{2s}}}{\sqrt{1+P^{2s}}} \tag{5.86}$$

又依据以上黎曼 ζ 函数的定义，对于复平面实轴方向上或 X 坐标轴方向上的所有自然数的倒数和用级数表示，则有

According to the above definition of the Riemann zeta function, for the reciprocal sum of all natural numbers in the direction of the real axis of the complex plane or in the direction of the X-axis expressed in series, there is

$$1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}+\frac{1}{7}+\cdots+\frac{1}{n}$$

并且进行解析延拓，即将它分母的指数 1 扩展到复数 s＝z'$=\frac{1}{2}+i\frac{p}{2}$，P 为从第 2 个有序素数开始的所有有序素数。即 p≠1。并令它的倒数和等于ζ(s)，则可得

And an analytic extension is carried out, that is, the exponent 1 of its denominator is extended to the complex number s = z' $=\frac{1}{2}+i\frac{p}{2}$, where P is all ordered primes starting with the second ordered prime. So p≠1. And if you add the reciprocal of that to ζ(s), you get

$$\zeta(s)=1+\frac{1}{2^s}+\frac{1}{3^s}+\frac{1}{4^s}+\frac{1}{5^s}+\frac{1}{6^s}+\frac{1}{7^s}+\cdots+\frac{1}{n^s}=\sum\frac{1}{n^s} \tag{5.87}$$

若进一步展开，即有

If we expand it further, we have

$$\zeta(s)=1+\frac{1}{2^{\frac{1}{2}+i\frac{p}{2}}}+\frac{1}{3^{\frac{1}{2}+i\frac{p}{2}}}+\frac{1}{4^{\frac{1}{2}+i\frac{p}{2}}}+\frac{1}{5^{\frac{1}{2}+i\frac{p}{2}}}+\frac{1}{6^{\frac{1}{2}+i\frac{p}{2}}}+\frac{1}{7^{\frac{1}{2}+i\frac{p}{2}}}+\cdots+\frac{1}{n^{\frac{1}{2}+i\frac{p}{2}}} \tag{5.88}$$

也就是　That is,

$$\zeta(s)=1+\frac{1}{\sqrt{2}}e^{-i\frac{p}{2}ln2}+\frac{1}{\sqrt{3}}e^{-i\frac{p}{2}ln3}+\cdots+\frac{1}{\sqrt{n}}e^{-i\frac{p}{2}lnn} \tag{5.89}$$

即 That's

$$\zeta(s)=\sum\frac{1}{n^s}=\sum\frac{1}{\sqrt{n}}e^{-i\frac{p}{2}lnn} \tag{5.90}$$

若令上式(5.90)

Let the above equation (5.90) be

$$\sqrt{n}=x',\ \frac{1}{\sqrt{n}}=y'$$

其中，n 为非零自然数。N∈N^*。则得，

Where n is a non-zero natural number. N∈N^*.

$$x'y'=\sqrt{n}\times\frac{1}{\sqrt{n}}=1$$

即得等轴双曲线方程

The equiaxial hyperbolic equation

$$1 = x'y' \qquad (5.91)$$

is obtained

式中：x'，y'>0；x'、y'∈R)。Where: x', y'>0; x', y'∈R).

又因为 And because of

$$\prod_{P=2}^{\infty}\frac{1}{1-\frac{1}{P^s}} = \sum\frac{1}{n^s} \qquad (5.92)$$

将上式(5.91)无穷多个等轴双曲线方程与黎曼ζ函数定义式(5.92)左右两边对应相乘，则得

By multiplying the equation of an infinite number of equiaxial hyperbolic equations of the above equation (5.91) with the corresponding left and right sides of the Riemann zeta function definition (5.92), we get

$$\prod_{P=2}^{\infty}\frac{1}{1-\frac{1}{P^s}} = \prod_{n=1}^{\infty}(x'y')\sum\frac{1}{n^s} \qquad (5.93)$$

将上式(5.93)代入式(5.86)，得

Substitute the above formula (5.93) into the formula (5.86) to get

$$\prod_{P=2}^{\infty}\frac{1}{1-\frac{1}{P^s}} = \prod_{n=1}^{\infty}(xy)\prod_{n=1}^{\infty}(x'y')\sum\frac{1}{n^s}\prod_{p=2}^{\infty}\frac{(1+\frac{1}{P^s})}{(1+\frac{1}{P^s})}\prod_{p=2}^{\infty}\frac{\sqrt{1+P^{2s}}}{\sqrt{1+P^{2s}}} \qquad (5.94)$$

$$\prod_{P=2}^{\infty}\frac{1}{1-\frac{1}{P^s}} = \prod_{n=1}^{\infty}(xy')(x'y)\sum\frac{1}{n^s}\prod_{p=2}^{\infty}\frac{(1+\frac{1}{P^s})}{(1+\frac{1}{P^s})}\prod_{p=2}^{\infty}\frac{\sqrt{1+P^{2s}}}{\sqrt{1+P^{2s}}} \qquad (5.95)$$

因为， Because,

$$x = \frac{1}{\sqrt{P}}，\ y = \sqrt{P}$$

$$x' = \sqrt{n}，\ y' = \frac{1}{\sqrt{n}}$$

因此，我们可以得到黎曼ζ函数的等价方程是：

Thus, we can obtain the equivalent equation for the Riemann zeta function:

$$\zeta(s) = \prod_{P=2}^{\infty}\frac{1}{1-\frac{1}{P^s}} = \prod_{n=1}^{\infty}(\frac{1}{\sqrt{P}}\times\sqrt{n}\times\sqrt{P}\times\frac{1}{\sqrt{n}})\sum\frac{1}{n^s}\prod_{p=2}^{\infty}\frac{(1+\frac{1}{P^s})}{(1+\frac{1}{P^s})}\prod_{p=2}^{\infty}\frac{\sqrt{1+P^{2s}}}{\sqrt{1+P^{2s}}} \qquad (5.96)$$

上式(5.96)黎曼ζ函数的等价方程的几何意义，如图 15 和 16 所示。

The geometric meaning of the equivalent equation of the Riemann zeta function of the above equation (5.96) is shown in Figures 15 and 16.

也可以表示为

It can also be expressed as

$$\frac{1}{\prod_{p=2}^{\infty}\left(1-\frac{1}{\sqrt{P}}e^{-i\frac{p}{2}lnp}\right)}=\zeta(s)=\sqrt{P}\times\frac{1}{\sqrt{n}}\times\frac{1}{\sqrt{P}}\times\sqrt{n}=\sum_{n}^{\infty}\frac{1}{\sqrt{n}}e^{-i\frac{p}{2}lnn}=1 \qquad (5.97)$$

或者 Or

$$\zeta(s)=\prod_{p}^{\infty}\left(1-\frac{1}{p^{s}}\right)^{-1}=\sum_{n}^{\infty}\frac{1}{n^{s}}=xy=1 \qquad (5.98)$$

也可以更进一步简化表示为：

It can also be further simplified as:

$$\zeta(s)=xy=\frac{1}{\sqrt{P}}\times\sqrt{n}\times\sqrt{P}\times\frac{1}{\sqrt{n}}=1 \qquad (5.99)$$

式中：只有当 P＝n，上式成立。

In the formula: Only if P = n, the above formula is true.

由此可见，只有当 n＝P 时，以上等价方程式(5.99)才能成立。如果 n≠p，即ζ(s) ≠ 1，以上等价方程式(5.99)就不成立。所以定理 12 得证成立。□

It follows that the above equivalent equation (5.99) is valid only if n = P. If n≠p, i.e. BB, the above equivalent equation (5.99) is not valid. So theorem 12 proves to be true. □

依据以上对黎曼 ζ 函数的等价方程几何意义分析可知，黎曼 ζ 函数实际上是由两个独立的常数 C＝1 的等轴双曲线复合而的一个特殊函数。其中，函数曲线的虚轴或者 Y 轴方向镶嵌所有素数，函数曲线的实轴或者 X 轴方向镶嵌所有自然数，只有当虚轴方向上的任意一个素数等于某一个自然数时，即 P＝n，并且任意一个素数和某一个自然数两者扫过的面积相等时，某一个自然数才是素数。因此，黎曼 ζ 函数曲线的虚轴或者 Y 轴方向镶嵌所有素数，好比一把素数丈量的标准尺，只要实轴或者 X 轴上自然数与虚轴或者 Y 轴上的素数一一对应，即可确定某一个自然数为素数。

According to the above analysis of the geometric meaning of the equivalent equations of the Riemann zeta function, it can be seen that the Riemann zeta function is actually a special function composed of two independent equiaxial hyperbolic curves of the constant C = 1. Among them, the virtual axis or Y-axis direction of the function curve is embedded with all prime numbers, and the real axis or X-axis direction of the function curve is embedded with all natural numbers. Only when any prime number in the direction of the virtual axis is equal to a natural number, that is, P = n, and the area swept by both a prime number and a natural number is equal, a natural number is prime. Therefore, the imaginary or Y-axis of the Riemann Zeta function curve is embedded with all prime numbers, like a standard ruler of prime measurement, so long as the natural numbers on the real or X-axis correspond to the prime numbers on the imaginary or Y-axis one by one, you can determine that a natural number is prime.

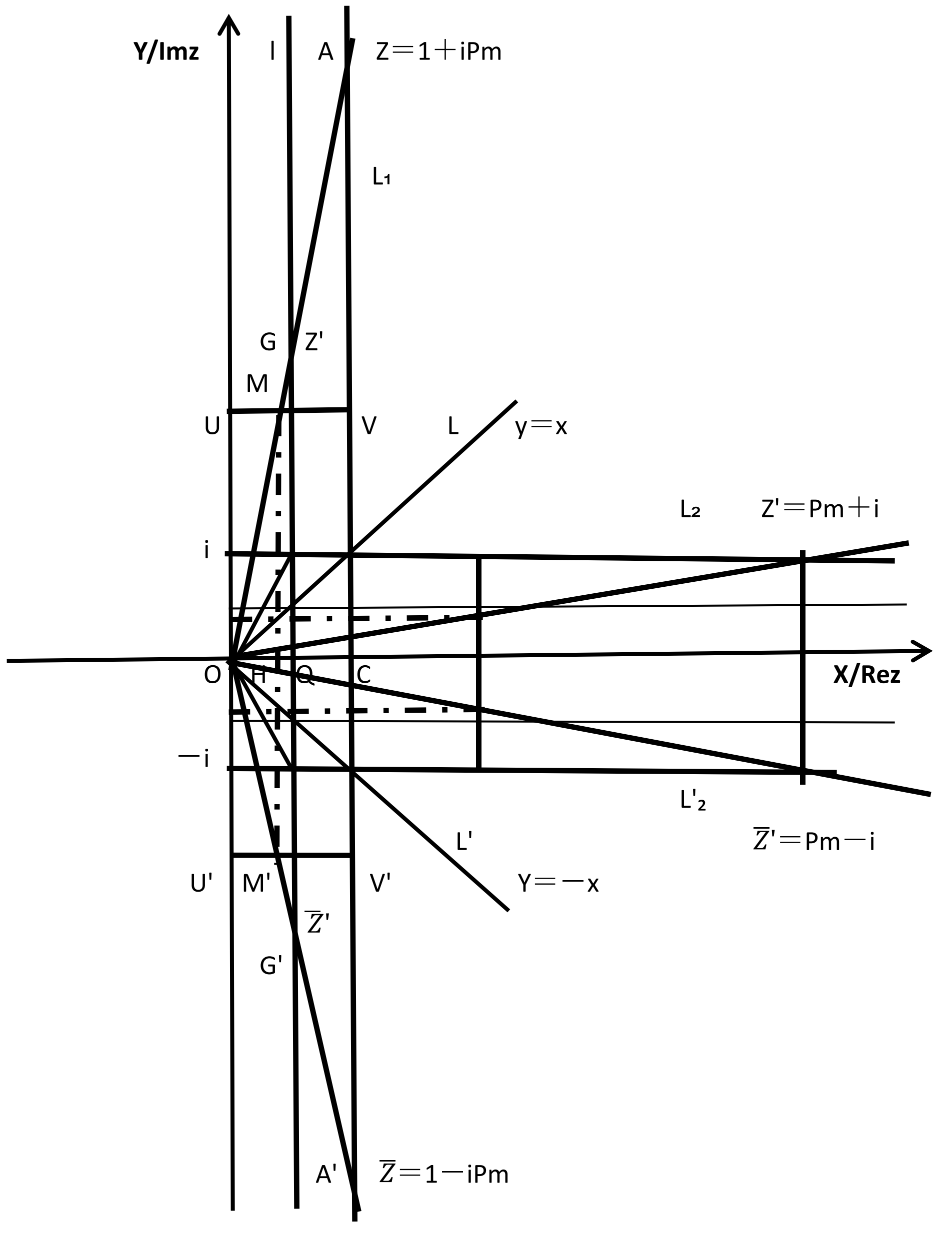

图 16：黎曼ζ函数的几何意义示意图
Figure 16. Schematic diagram of the geometric meaning of the Riemann zeta function

又因为所有素数都是在定义直线 x＝1 上的任意一点 A 和坐标系原点 O 连接线段，所得直线 OA 沿任意等轴双曲移动由 A 点到达 A'点时，该直线 OA 扫过的面积以等轴双曲线的对称直线 L 为对称，即上下以直线 OA 或 OA'、对称直线 L 以及双曲线围成的曲边三角形面积相等。也就是曲边三角形△AOW_m的面积等于曲边三角形△A'OW_m的面积。对于 xy＝1 的等

轴双曲线，则有曲边三角形△MOP_1的面积等于曲边三角形△M'OP_1的面积。曲边三角形△NOP_1的面积等于曲边三角形△N'OP_1的面积。如图 15 所示。

And because all prime numbers are defined by any point A on the line x = 1 and the origin of the coordinate system O to connect the line segment, the resulting line OA along any equiaxial hyperbolic movement from point A to point A', the area of the line OA swept by the symmetric line L of the equiaxial hyperbola is symmetric. That is, the curved side triangle surrounded by the line OA or OA', the symmetric line L and the hyperbola has the same area. So the area of the curved triangle △AOW_m is equal to the area of the curved triangle △A'OW_m. For an equiaxial hyperbola with xy = 1, then the area of the curved triangle △MOP_1 is equal to the area of the curved triangle △M'OP_1. The area of the curved triangle △NOP_1 is equal to the area of the curved triangle △N'OP_1. As shown in Figure 15.

这时黎曼 ζ 函数的等价方程 xy＝1，对于该方程曲线与 X、Y 两坐标轴所围成的面积以对称直线 y＝x 为分界线，两部分总是对应相等。即是

In this case, the equivalent equation of the Riemann zeta function xy = 1, for this equation curve and X, Y axis surrounded by the area of the symmetric line y = x as the dividing line, the two parts always correspond to equal. That's

$$\int_{\frac{1}{\infty}}^{1}(\mathrm{xy})'\ \mathrm{dy} = 1 + \int_{1}^{\infty}(\mathrm{xy})'\ \mathrm{dx} \qquad (5.100)$$

由于自然数为非连续性实数，根据微积分的几何意义，对变量 x 积分就等于每个素数对应的面积，其面积可用级数形式表示为：

Since the natural numbers are discontinuous real numbers, according to the geometric meaning of calculus, the integral of the variable x is equal to the area corresponding to each prime number, whose area can be expressed in series form:

$$\prod_{\mathrm{p}=2}^{\infty}\frac{1}{\left(1-\frac{1}{\sqrt{\mathrm{P}}}e^{-i\frac{p}{2}lnp}\right)} = 1\times 1 + 1\times\frac{1}{\sqrt{2}}e^{-\mathrm{i}\frac{p}{2}ln2} + 1\times\frac{1}{\sqrt{3}}e^{-\mathrm{i}\frac{p}{2}ln3} + \cdots + 1\times\frac{1}{\sqrt{\mathrm{n}}}e^{-\mathrm{i}\frac{p}{2}lnn} \qquad (5.101)$$

因此，为了更加深刻地理解其数学含义，现将每一个有序素数与自然数解析延拓的对应关系展开式如下。

Therefore, in order to understand its mathematical meaning more deeply, the correspondence between each ordered prime number and the analytic extension of natural numbers is expanded as follows.

当自然数 2 为素数时，有序素数 2 和自然数 2 两者对应的角度面积相等，因此将第 2 个素数 2，代入上式(5.101)，得

When the natural number 2 is prime, the angular area corresponding to the ordered prime number 2 and the natural number 2 is equal, so the second prime number 2 is substituted into the above equation (5.101), which is obtained

$$\frac{1}{\left((\frac{1}{2}+\mathrm{i})+(\frac{1}{2}-\mathrm{i})-\frac{1}{\sqrt{2}}e^{-\mathrm{i}\frac{2}{2}ln2}\right)} = (\zeta(\mathrm{s}) = \frac{1}{\sqrt{2}}\times\sqrt{2} = 1) = 1 + \frac{1}{2^{\frac{1}{2}+\mathrm{i}\frac{2}{2}}}$$

$$= 1 + \frac{1}{\sqrt{2}}e^{-\mathrm{i}\frac{2}{2}ln2}$$

有序素数 2 对应的级数表示面积之和为：

The series corresponding to the ordered prime number 2 represents the sum of the areas:

$$\int_{\frac{1}{\infty}}^{\frac{1}{\sqrt{2}}}(xy)'\ \ dy=1+\int_{1}^{\sqrt{2}}(xy)'\ \ dx=1\times 1+1\times\frac{1}{\sqrt{2}}e^{-i\frac{2}{2}ln2}$$

当自然数 3 为素数时，有序素数 3 和自然数 3 两者角度面积相等，因此将第 3 个素数 3，代入上式(5.101)，得

When the natural number 3 is prime, the ordered prime number 3 and the natural number 3 have the same angular area, so the third prime number 3 is substituted into the above equation (5.101), which is obtained

$$\frac{1}{\left((\frac{1}{2}+i)+(\frac{1}{2}-i)-\frac{1}{\sqrt{3}}e^{-i\frac{3}{2}ln3}\right)}=(\zeta(s)=\frac{1}{\sqrt{3}}\times\sqrt{3}=1)=1+\frac{1}{2^{\frac{1}{2}+i\frac{2}{2}}}+\frac{1}{3^{\frac{1}{2}+i\frac{3}{2}}}$$

$$=1+\frac{1}{\sqrt{2}}e^{-i\frac{2}{2}ln2}+\frac{1}{\sqrt{3}}e^{-i\frac{3}{2}ln3}$$

有序素数 3 对应的级数表示面积之和为：

The series corresponding to the ordered prime number 3 represents the sum of areas as:

$$\int_{\frac{1}{\infty}}^{\frac{1}{\sqrt{3}}}(xy)'dy=1+\int_{1}^{\sqrt{3}}(xy)'\,dx=1\times 1+1\times\frac{1}{\sqrt{2}}e^{-i\frac{2}{2}ln2}+1\times\frac{1}{\sqrt{3}}e^{-i\frac{3}{2}ln3}$$

当自然数 5 为素数时，有序素数 5 和自然数 5 两者角度面积相等，因此将第 4 个素数 5，代入上式(5.101)，得

When the natural number 5 is prime, the ordered prime number 5 and the natural number 5 have the same angular area, so the fourth prime number 5 is substituted into the above equation (5.101), which is obtained

$$\frac{1}{\left((\frac{1}{2}+i)+(\frac{1}{2}-i)-\frac{1}{\sqrt{5}}e^{-i\frac{5}{2}ln5}\right)}=(\zeta(s)=\frac{1}{\sqrt{5}}\times\sqrt{5}=1)=1+\frac{1}{2^{\frac{1}{2}+i\frac{2}{2}}}+\frac{1}{3^{\frac{1}{2}+i\frac{3}{2}}}+\frac{1}{4^{\frac{1}{2}+i\frac{5}{2}}}+\frac{1}{5^{\frac{1}{2}+i\frac{5}{2}}}$$

$$=1+\frac{1}{\sqrt{2}}e^{-i\frac{2}{2}ln2}+\frac{1}{\sqrt{3}}e^{-i\frac{3}{2}ln3}+\frac{1}{\sqrt{4}}e^{-i\frac{5}{2}ln4}+\frac{1}{\sqrt{5}}e^{-i\frac{5}{2}ln5}$$

有序素数 5 对应的级数表示面积之和为：

The series corresponding to the ordered prime number 5 represents the sum of the areas:

$$\int_{\frac{1}{\infty}}^{\frac{1}{\sqrt{5}}}(xy)'\ \ dy=1+\int_{1}^{\sqrt{5}}(xy)'\ \ dx$$

$$=1\times 1+1\times\frac{1}{\sqrt{2}}e^{-i\frac{2}{2}ln2}+1\times\frac{1}{\sqrt{3}}e^{-i\frac{3}{2}ln3}+\cdots+1\times\frac{1}{\sqrt{5}}e^{-i\frac{5}{2}ln5}$$

当自然数 7 为素数时，有序素数 7 和自然数 7 两者角度面积相等，因此将第 5 个素数 7，代入上式(5.101)，得

When the natural number 7 is prime, the ordered prime number 7 and the natural number 7 have the same angular area, so the fifth prime number 7 is substituted into the above equation

(5.101), which is obtained

$$\frac{1}{\left((\frac{1}{2}+\mathrm{i})+(\frac{1}{2}-\mathrm{i})-\frac{1}{\sqrt{7}}e^{-\mathrm{i}\frac{7}{2}ln7}\right)}=(\zeta(\mathrm{s})=\frac{1}{\sqrt{7}}\times\sqrt{7}=1)$$

$$=1+\frac{1}{2^{\frac{1}{2}+\mathrm{i}\frac{2}{2}}}+\frac{1}{3^{\frac{1}{2}+\mathrm{i}\frac{3}{2}}}+\frac{1}{4^{\frac{1}{2}+\mathrm{i}\frac{5}{2}}}+\frac{1}{5^{\frac{1}{2}+\mathrm{i}\frac{5}{2}}}+\frac{1}{6^{\frac{1}{2}+\mathrm{i}\frac{7}{2}}}+\frac{1}{7^{\frac{1}{2}+\mathrm{i}\frac{7}{2}}}$$

$$=1+\frac{1}{\sqrt{2}}e^{-\mathrm{i}\frac{2}{2}ln2}+\frac{1}{\sqrt{3}}e^{-\mathrm{i}\frac{3}{2}ln3}+\frac{1}{\sqrt{4}}e^{-\mathrm{i}\frac{5}{2}ln4}+\frac{1}{\sqrt{5}}e^{-\mathrm{i}\frac{5}{2}ln5}+\frac{1}{\sqrt{6}}e^{-\mathrm{i}\frac{7}{2}ln6}+\frac{1}{\sqrt{7}}e^{-\mathrm{i}\frac{7}{2}ln7}$$

有序素数 7 对应的级数表示面积之和为：

The series corresponding to the ordered prime number 7 represents the sum of the areas:

$$\int_{\frac{1}{\infty}}^{\frac{1}{\sqrt{7}}}(\mathrm{xy})'\ \ \mathrm{dy}=1+\int_{1}^{\sqrt{7}}(\mathrm{xy})'\ \ \mathrm{dx}$$

$$=1\times1+1\times\frac{1}{\sqrt{2}}e^{-\mathrm{i}\frac{2}{2}ln2}+1\times\frac{1}{\sqrt{3}}e^{-\mathrm{i}\frac{3}{2}ln3}+\cdots+1\times\frac{1}{\sqrt{7}}e^{-\mathrm{i}\frac{7}{2}ln7}$$

当自然数 11 为素数时，有序素数 11 和自然数 11 两者角度面积相等，因此将第 6 个素数 11，代入上式(5.101)，得

When the natural number 11 is prime, the ordered prime 11 and the natural number 11 have the same angular area, so substituting the sixth prime 11 into the above equation (5.101) gives

$$\frac{1}{\left((\frac{1}{2}+\mathrm{i})+(\frac{1}{2}-\mathrm{i})-\frac{1}{\sqrt{11}}e^{-i\frac{11}{2}ln11}\right)}=(\zeta(\mathrm{s})=\frac{1}{\sqrt{11}}\times\sqrt{11}=1)$$

$$=1+\frac{1}{2^{\frac{1}{2}+\mathrm{i}\frac{2}{2}}}+\frac{1}{3^{\frac{1}{2}+\mathrm{i}\frac{3}{2}}}+\frac{1}{4^{\frac{1}{2}+\mathrm{i}\frac{5}{2}}}+\frac{1}{5^{\frac{1}{2}+\mathrm{i}\frac{5}{2}}}+\frac{1}{6^{\frac{1}{2}+\mathrm{i}\frac{7}{2}}}+\frac{1}{7^{\frac{1}{2}+\mathrm{i}\frac{7}{2}}}+\frac{1}{8^{\frac{1}{2}+\mathrm{i}\frac{11}{2}}}+\frac{1}{9^{\frac{1}{2}+\mathrm{i}\frac{11}{2}}}+\frac{1}{10^{\frac{1}{2}+\mathrm{i}\frac{11}{2}}}+\frac{1}{11^{\frac{1}{2}+\mathrm{i}\frac{11}{2}}}$$

$$=1+\frac{1}{\sqrt{2}}e^{-\mathrm{i}\frac{2}{2}ln2}+\frac{1}{\sqrt{3}}e^{-\mathrm{i}\frac{3}{2}ln3}+\frac{1}{\sqrt{4}}e^{-\mathrm{i}\frac{5}{2}ln4}+\frac{1}{\sqrt{5}}e^{-\mathrm{i}\frac{5}{2}ln5}+\frac{1}{\sqrt{6}}e^{-\mathrm{i}\frac{7}{2}ln6}+\frac{1}{\sqrt{7}}e^{-\mathrm{i}\frac{7}{2}ln7}$$

$$+\frac{1}{\sqrt{8}}e^{-\mathrm{i}\frac{11}{2}ln8}+\frac{1}{\sqrt{9}}e^{-\mathrm{i}\frac{11}{2}ln9}+\frac{1}{\sqrt{10}}e^{-\mathrm{i}\frac{11}{2}ln10}+\frac{1}{\sqrt{11}}e^{-\mathrm{i}\frac{11}{2}ln11}$$

有序素数 11 对应的级数表示面积之和为：

The series corresponding to the ordered prime number 11 represents the sum of areas as:

$$\int_{\frac{1}{\infty}}^{\frac{1}{\sqrt{11}}}(xy)'\ \ dy = 1 + \int_{1}^{\sqrt{11}}(xy)'\ \ dx$$

$$= 1\times 1 + 1\times\frac{1}{\sqrt{2}}e^{-i\frac{2}{2}ln2} + 1\times\frac{1}{\sqrt{3}}e^{-i\frac{3}{2}ln3} + \cdots + 1\times\frac{1}{\sqrt{11}}e^{-i\frac{11}{2}ln11}$$

当自然数 13 为素数时，有序素数 13 和自然数 13 两者角度面积相等，因此将第 7 个素数 13，代入上式(5.101)，得

When the natural number 13 is prime, the ordered prime number 13 and the natural number 13 have the same angular area, so the seventh prime number 13 is substituted into the above equation (5.101) to obtain

$$\frac{1}{\left((\frac{1}{2}+i)+(\frac{1}{2}-i)-\frac{1}{\sqrt{13}}e^{-i\frac{13}{2}ln13}\right)} = (\zeta(s) = \frac{1}{\sqrt{13}}\times\sqrt{13} = 1)$$

$$= 1 + \frac{1}{2^{\frac{1}{2}+i\frac{2}{2}}} + \frac{1}{3^{\frac{1}{2}+i\frac{3}{2}}} + \frac{1}{4^{\frac{1}{2}+i\frac{5}{2}}} + \frac{1}{5^{\frac{1}{2}+i\frac{5}{2}}} + \frac{1}{6^{\frac{1}{2}+i\frac{7}{2}}} + \frac{1}{7^{\frac{1}{2}+i\frac{7}{2}}} + \frac{1}{8^{\frac{1}{2}+i\frac{11}{2}}} + \frac{1}{9^{\frac{1}{2}+i\frac{11}{2}}} + \frac{1}{10^{\frac{1}{2}+i\frac{11}{2}}}$$

$$+ \frac{1}{11^{\frac{1}{2}+i\frac{11}{2}}} + \frac{1}{12^{\frac{1}{2}+i\frac{13}{2}}} + \frac{1}{13^{\frac{1}{2}+i\frac{13}{2}}}$$

$$= 1 + \frac{1}{\sqrt{2}}e^{-i\frac{2}{2}ln2} + \frac{1}{\sqrt{3}}e^{-i\frac{3}{2}ln3} + \frac{1}{\sqrt{4}}e^{-i\frac{5}{2}ln4} + \frac{1}{\sqrt{5}}e^{-i\frac{5}{2}ln5} + \frac{1}{\sqrt{6}}e^{-i\frac{7}{2}ln6} + \frac{1}{\sqrt{7}}e^{-i\frac{7}{2}ln7}$$

$$+ \frac{1}{\sqrt{8}}e^{-i\frac{11}{2}ln8} + \frac{1}{\sqrt{9}}e^{-i\frac{11}{2}ln9} + \frac{1}{\sqrt{10}}e^{-i\frac{11}{2}ln10} + \frac{1}{\sqrt{11}}e^{-i\frac{11}{2}ln11}$$

$$+ \frac{1}{\sqrt{12}}e^{-i\frac{13}{2}ln12} + \frac{1}{\sqrt{13}}e^{-i\frac{13}{2}ln13}$$

有序素数 13 对应的级数表示面积之和为：

The series corresponding to the ordered prime number 13 represents the sum of the areas:

$$\int_{\frac{1}{\infty}}^{\frac{1}{\sqrt{13}}}(xy)'\ \ dy = 1 + \int_{1}^{\sqrt{13}}(xy)'\ \ dx$$

$$= 1\times 1 + 1\times\frac{1}{\sqrt{2}}e^{-i\frac{2}{2}ln2} + 1\times\frac{1}{\sqrt{3}}e^{-i\frac{3}{2}ln3} + \cdots + 1\times\frac{1}{\sqrt{13}}e^{-i\frac{13}{2}ln13}$$

当自然数 17 为素数时，有序素数 17 和自然数 17 两者角度面积相等，因此将第 8 个素数 17，代入上式(5.101)，得

When the natural number 17 is prime, the ordered prime 17 and the natural number 17 have the same angular area, so the eighth prime 17, substituted into the above equation (5.101), gives

$$\frac{1}{\left((\frac{1}{2}+\mathrm{i})+(\frac{1}{2}-\mathrm{i})-\frac{1}{\sqrt{17}}e^{-i\frac{17}{2}ln17}\right)}=(\zeta(s)=\frac{1}{\sqrt{17}}\times\sqrt{17}=1)$$

$$=1+\frac{1}{2^{\frac{1}{2}+\mathrm{i}\frac{2}{2}}}+\frac{1}{3^{\frac{1}{2}+\mathrm{i}\frac{3}{2}}}+\frac{1}{4^{\frac{1}{2}+\mathrm{i}\frac{5}{2}}}+\frac{1}{5^{\frac{1}{2}+\mathrm{i}\frac{5}{2}}}+\frac{1}{6^{\frac{1}{2}+\mathrm{i}\frac{7}{2}}}+\frac{1}{7^{\frac{1}{2}+\mathrm{i}\frac{7}{2}}}+\frac{1}{8^{\frac{1}{2}+\mathrm{i}\frac{11}{2}}}+\frac{1}{9^{\frac{1}{2}+\mathrm{i}\frac{11}{2}}}+\frac{1}{10^{\frac{1}{2}+\mathrm{i}\frac{11}{2}}}$$

$$+\frac{1}{11^{\frac{1}{2}+\mathrm{i}\frac{11}{2}}}+\frac{1}{12^{\frac{1}{2}+\mathrm{i}\frac{13}{2}}}+\frac{1}{13^{\frac{1}{2}+\mathrm{i}\frac{13}{2}}}+\frac{1}{14^{\frac{1}{2}+\mathrm{i}\frac{17}{2}}}+\frac{1}{15^{\frac{1}{2}+\mathrm{i}\frac{17}{2}}}+\frac{1}{16^{\frac{1}{2}+\mathrm{i}\frac{17}{2}}}+\frac{1}{17^{\frac{1}{2}+\mathrm{i}\frac{17}{2}}}$$

$$=1+\frac{1}{\sqrt{2}}e^{-\mathrm{i}\frac{2}{2}ln2}+\frac{1}{\sqrt{3}}e^{-\mathrm{i}\frac{3}{2}ln3}+\frac{1}{\sqrt{4}}e^{-\mathrm{i}\frac{5}{2}ln4}+\frac{1}{\sqrt{5}}e^{-\mathrm{i}\frac{5}{2}ln5}+\frac{1}{\sqrt{6}}e^{-\mathrm{i}\frac{7}{2}ln6}+\frac{1}{\sqrt{7}}e^{-\mathrm{i}\frac{7}{2}ln7}$$

$$+\frac{1}{\sqrt{8}}e^{-\mathrm{i}\frac{11}{2}ln8}+\frac{1}{\sqrt{9}}e^{-\mathrm{i}\frac{11}{2}ln9}+\frac{1}{\sqrt{10}}e^{-\mathrm{i}\frac{11}{2}ln10}+\frac{1}{\sqrt{11}}e^{-\mathrm{i}\frac{11}{2}ln11}+\frac{1}{\sqrt{12}}e^{-\mathrm{i}\frac{13}{2}ln12}$$

$$+\frac{1}{\sqrt{13}}e^{-\mathrm{i}\frac{13}{2}ln13}+\frac{1}{\sqrt{14}}e^{-\mathrm{i}\frac{17}{2}ln14}+\frac{1}{\sqrt{15}}e^{-\mathrm{i}\frac{17}{2}ln15}$$

$$+\frac{1}{\sqrt{16}}e^{-\mathrm{i}\frac{17}{2}ln16}+\frac{1}{\sqrt{17}}e^{-\mathrm{i}\frac{17}{2}ln17}$$

有序素数 17 对应的级数表示面积之和为：

The series corresponding to the ordered prime number 17 represents the sum of areas as:

$$\int_{\frac{1}{\infty}}^{\frac{1}{\sqrt{17}}}(\mathrm{xy})'\ \ \mathrm{dy}=1+\int_{1}^{\sqrt{17}}(\mathrm{xy})'\ \ \mathrm{dx}$$

$$=1\times1+1\times\frac{1}{\sqrt{2}}e^{-\mathrm{i}\frac{2}{2}ln2}+1\times\frac{1}{\sqrt{3}}e^{-\mathrm{i}\frac{3}{2}ln3}+\cdots+1\times\frac{1}{\sqrt{17}}e^{-\mathrm{i}\frac{17}{2}ln17}$$

当自然数 19 为素数时，有序素数 19 和自然数 19 两者角度面积相等，因此将第 9 个素数 19，代入上式(5.101)，得

When the natural number 19 is prime, the ordered prime number 19 and the natural number 19 have the same angular area, so the ninth prime number 19 is substituted into the above equation (5.101) to obtain

$$\frac{1}{\left((\frac{1}{2}+\mathrm{i})+(\frac{1}{2}-\mathrm{i})-\frac{1}{\sqrt{19}}e^{-i\frac{19}{2}ln19}\right)}=(\zeta(s)=\frac{1}{\sqrt{19}}\times\sqrt{19}=1)$$

$$=1+\frac{1}{2^{\frac{1}{2}+\mathrm{i}\frac{2}{2}}}+\frac{1}{3^{\frac{1}{2}+\mathrm{i}\frac{3}{2}}}+\frac{1}{4^{\frac{1}{2}+\mathrm{i}\frac{5}{2}}}+\frac{1}{5^{\frac{1}{2}+\mathrm{i}\frac{5}{2}}}+\frac{1}{6^{\frac{1}{2}+\mathrm{i}\frac{7}{2}}}+\frac{1}{7^{\frac{1}{2}+\mathrm{i}\frac{7}{2}}}+\frac{1}{8^{\frac{1}{2}+\mathrm{i}\frac{11}{2}}}+\frac{1}{9^{\frac{1}{2}+\mathrm{i}\frac{11}{2}}}+\frac{1}{10^{\frac{1}{2}+\mathrm{i}\frac{11}{2}}}+\frac{1}{11^{\frac{1}{2}+\mathrm{i}\frac{11}{2}}}$$

$$+\frac{1}{12^{\frac{1}{2}+i\frac{13}{2}}}+\frac{1}{13^{\frac{1}{2}+i\frac{13}{2}}}+\frac{1}{14^{\frac{1}{2}+i\frac{17}{2}}}+\frac{1}{15^{\frac{1}{2}+i\frac{17}{2}}}+\frac{1}{16^{\frac{1}{2}+i\frac{17}{2}}}+\frac{1}{17^{\frac{1}{2}+i\frac{17}{2}}}+\frac{1}{18^{\frac{1}{2}+i\frac{19}{2}}}+\frac{1}{19^{\frac{1}{2}+i\frac{19}{2}}}$$

$$=1+\frac{1}{\sqrt{2}}e^{-i\frac{2}{2}ln2}+\frac{1}{\sqrt{3}}e^{-i\frac{3}{2}ln3}+\frac{1}{\sqrt{4}}e^{-i\frac{5}{2}ln4}+\frac{1}{\sqrt{5}}e^{-i\frac{5}{2}ln5}+\frac{1}{\sqrt{6}}e^{-i\frac{7}{2}ln6}+\frac{1}{\sqrt{7}}e^{-i\frac{7}{2}ln7}$$

$$+\frac{1}{\sqrt{8}}e^{-i\frac{11}{2}ln8}+\frac{1}{\sqrt{9}}e^{-i\frac{11}{2}ln9}+\frac{1}{\sqrt{10}}e^{-i\frac{11}{2}ln10}+\frac{1}{\sqrt{11}}e^{-i\frac{11}{2}ln11}+\frac{1}{\sqrt{12}}e^{-i\frac{13}{2}ln12}$$

$$+\frac{1}{\sqrt{13}}e^{-i\frac{13}{2}ln13}+\frac{1}{\sqrt{14}}e^{-i\frac{17}{2}ln14}+\frac{1}{\sqrt{15}}e^{-i\frac{17}{2}ln15}+\frac{1}{\sqrt{16}}e^{-i\frac{17}{2}ln16}$$

$$+\frac{1}{\sqrt{17}}e^{-i\frac{17}{2}ln17}+\frac{1}{\sqrt{18}}e^{-i\frac{19}{2}ln18}+\frac{1}{\sqrt{19}}e^{-i\frac{19}{2}ln19}$$

有序素数 19 对应的级数表示面积之和为：

The series corresponding to the ordered prime number 19 represents the sum of areas as:

$$\int_{\frac{1}{\infty}}^{\frac{1}{\sqrt{19}}}(xy)'\ dy=1+\int_{1}^{\sqrt{19}}(xy)'\ dx$$

$$=1\times1+1\times\frac{1}{\sqrt{2}}e^{-i\frac{2}{2}ln2}+1\times\frac{1}{\sqrt{3}}e^{-i\frac{3}{2}ln3}+\cdots+1\times\frac{1}{\sqrt{19}}e^{-i\frac{19}{2}ln19}$$

当自然数 n 为素数时，有序素数 P 和自然数 n 两者角度面积相等，因此将第 m 个素数 P，代入上式(5.101)，得

When the natural number n is prime, the ordered prime number P and the natural number n have the same angular area, so the m-th prime number P is substituted into the above equation (5.101), and

$$\frac{1}{\left((\frac{1}{2}+i)+(\frac{1}{2}-i)-\frac{1}{\sqrt{P}}e^{-i\frac{P}{2}lnP}\right)}=(\zeta(s)=\frac{1}{\sqrt{P}}\times\sqrt{P}=1)$$

$$=1+\frac{1}{2^{\frac{1}{2}+i\frac{2}{2}}}+\frac{1}{3^{\frac{1}{2}+i\frac{3}{2}}}+\frac{1}{4^{\frac{1}{2}+i\frac{5}{2}}}+\frac{1}{5^{\frac{1}{2}+i\frac{5}{2}}}+\frac{1}{6^{\frac{1}{2}+i\frac{7}{2}}}+\frac{1}{7^{\frac{1}{2}+i\frac{7}{2}}}+\frac{1}{8^{\frac{1}{2}+i\frac{11}{2}}}+\frac{1}{9^{\frac{1}{2}+i\frac{11}{2}}}+\frac{1}{10^{\frac{1}{2}+i\frac{11}{2}}}+\frac{1}{11^{\frac{1}{2}+i\frac{11}{2}}}$$

$$+\frac{1}{12^{\frac{1}{2}+i\frac{13}{2}}}+\frac{1}{13^{\frac{1}{2}+i\frac{13}{2}}}+\frac{1}{14^{\frac{1}{2}+i\frac{17}{2}}}+\frac{1}{15^{\frac{1}{2}+i\frac{17}{2}}}+\frac{1}{16^{\frac{1}{2}+i\frac{17}{2}}}+\frac{1}{17^{\frac{1}{2}+i\frac{17}{2}}}$$

$$+\frac{1}{18^{\frac{1}{2}+i\frac{19}{2}}}+\frac{1}{19^{\frac{1}{2}+i\frac{19}{2}}}+\cdots+\frac{1}{P^{\frac{1}{2}+i\frac{P}{2}}}$$

$$=1+\frac{1}{\sqrt{2}}e^{-i\frac{2}{2}ln2}+\frac{1}{\sqrt{3}}e^{-i\frac{3}{2}ln3}+\frac{1}{\sqrt{4}}e^{-i\frac{5}{2}ln4}+\frac{1}{\sqrt{5}}e^{-i\frac{5}{2}ln5}+\frac{1}{\sqrt{6}}e^{-i\frac{7}{2}ln6}+\frac{1}{\sqrt{7}}e^{-i\frac{7}{2}ln7}$$

$$+\frac{1}{\sqrt{8}}e^{-i\frac{11}{2}ln8}+\frac{1}{\sqrt{9}}e^{-i\frac{11}{2}ln9}+\frac{1}{\sqrt{10}}e^{-i\frac{11}{2}ln10}+\frac{1}{\sqrt{11}}e^{-i\frac{11}{2}ln11}+\frac{1}{\sqrt{12}}e^{-i\frac{13}{2}ln12}$$

$$+\frac{1}{\sqrt{13}}e^{-i\frac{13}{2}ln13}+\frac{1}{\sqrt{14}}e^{-i\frac{17}{2}ln14}+\frac{1}{\sqrt{15}}e^{-i\frac{17}{2}ln15}+\frac{1}{\sqrt{16}}e^{-i\frac{17}{2}ln16}$$

$$+\frac{1}{\sqrt{17}}e^{-i\frac{17}{2}ln17}+\frac{1}{\sqrt{18}}e^{-i\frac{19}{2}ln18}+\frac{1}{\sqrt{19}}e^{-i\frac{19}{2}ln19}+\cdots+\frac{1}{\sqrt{p}}e^{-i\frac{p}{2}lnp}$$

is obtained

...

因此，依此类推，对于所有有序素数 P 对应的级数表示面积之和为：

Thus, by inference, the sum of the series representation areas for all ordered prime numbers P is:

$$\int_{\frac{1}{\infty}}^{\frac{1}{\sqrt{p}}}(xy)'\ dy=1+\int_{1}^{\sqrt{p}}(xy)'\ dx$$

$$=1\times 1+1\times\frac{1}{\sqrt{2}}e^{-i\frac{2}{2}ln2}+1\times\frac{1}{\sqrt{3}}e^{-i\frac{3}{2}ln3}+\cdots+1\times\frac{1}{\sqrt{p}}e^{-i\frac{p}{2}lnp} \qquad (5.102)$$

即

$$\int_{\frac{1}{\infty}}^{\frac{1}{\sqrt{p}}}(xy)'\ dy=1+\int_{1}^{\sqrt{p}}(xy)'\ dx=\sum\frac{1}{\sqrt{n}}e^{-i\frac{p}{2}lnp} \qquad (5.103)$$

其中， Among them,

$$\frac{1}{\prod_{p=2}^{\infty}\left(1-\frac{1}{\sqrt{P}}e^{-i\frac{p}{2}lnp}\right)}=\zeta(s)=\sum_{n}^{\infty}\frac{1}{\sqrt{n}}e^{-i\frac{p}{2}lnn}$$

式中：P 为素数。n 为自然数。n＝1，2，3，4，5，…，p。xy＝1；x，y≠0；x，y∈R。n，P∈N^*。上式(5.103)作者称之为素数的积分-级数表达式方程。

Where: P is a prime number. n is a natural number. n = 1,2,3,4,5,... , p. xy is equal to 1; x, y≠0; x, y∈R. n, P∈ N^*. The above equation (5.103) is called an integral-series expression equation of prime numbers by the author.

最后，根据黎曼ζ函数非平凡零点的等价方程成立。这里我们给出定理 12 的几个推论如下。

Finally, the equivalent equation based on the non-trivial zeros of the Riemann zeta function is established. Here we give several corollaries to theorem 12 as follows.

我们知道在实平面内以任意实数 C 为常数等轴双曲线方程：

We know the equiaxial hyperbolic equation in the real plane with any real number C as constant:

$$xy = C，or\ y = \frac{C}{x}\ \ (x，y，C \neq 0；x，y，C \in R)$$

其代表的曲线是一系列等轴双曲线族，并且每一个象限内的等轴双曲线均以直线 y＝|x|对称。根据素数定义方程定理 10，对于等轴双曲线我们可知，当 x＝1 时，可得到与等轴双曲线相交点 A 的 Y 轴坐标值为 y＝C(C≠0，C 为实数)，为等轴双曲线方程的一个常数。也就是说，当 x＝1 时，即 y＝C，所有实数(包括所有素数)都被等轴双曲线平移到实轴 x＝1 的直线上，与 y 轴相同的垂直方向上。当 y＝1 时，即 x＝C，即所有实数(包括所有素数)都经等轴双曲线延伸到实轴 y＝1 的直线上，与 x 轴相同的水平方向上。该方程定义域和值域是除 x，y≠0 的全体实数集。如图 15 所示。

The curves represented are a family of equiaxial hyperboloids, and the equiaxial hyperboloids in each quadrant are symmetric by the line y = |x|. According to the prime definition equation theorem 10, for an equiaxial hyperbola, we can see that when x = 1, the Y-axis coordinate value of the intersection point A with the equiaxial hyperbola can be obtained as y = C(C≠0, C is a real number), which is a constant of the equiaxial hyperbola equation. That is, when x = 1, i.e. y = C, all real numbers (including all prime numbers) are translated by the equiaxial hyperbola to a line on the real axis x = 1, in the same vertical direction as the Y-axis. When y = 1, that is, x = C, that is, all real numbers (including all prime numbers) are extended by an equiaxial hyperbola to a line with the real axis y = 1, in the same horizontal direction as the X-axis. The domain and range of this equation are all real numbers divided by x and y≠0. As shown in Figure 15.

其次，我们连结直线 x＝1 与任意等轴双曲线 xy＝C，两者相交点 A 和平面坐标系原点 O，则得直线方程：

Secondly, we link the line x = 1 with any equiaxial hyperbola xy = C, the intersection point A and the origin O of the plane coordinate system, then we get the equation of the line:

$$y = kx$$

其中，k≠0，k 为直线方程斜率。即 k∈R。k 为任意实数。

Where, k≠0, k is the slope of the linear equation. That is k∈R. k is any real number.

将方程 y＝kx 代入以上方程 xy＝C，则得 BBAA

Substituting the equation y = kx into the above equation xy = C gives

$$kx^2 = C$$

其中，k 为斜率；x，y，k≠0；C>0，C 为常数；x，y；k，C∈R。

Where k is the slope; x, y, k≠0; C>0, C is a constant; x, y; k, C∈R.

解以上方程式，我们可得它们相交点 M 的 x、y 轴坐标值是：

Solving the above equation, we can get the x and y coordinate values of their intersecting points M:

$$x = \sqrt{\frac{C}{k}}\quad ，y = k\sqrt{\frac{C}{k}}$$

因此，由此可见，以上 x、y 两值仅在直线斜率 k 与常数 C 取同号时有意义。当直线斜率 k 与常数 C 取异号时，以上 x、y 两坐标值则无实数解。

Therefore, it can be seen that the above values of x and y are only meaningful if the slope of the line k is the same sign as the constant C. When the slope of the line k and the constant C are different signs, the above x and y coordinates have no real solution.

为了确保任意等轴双曲线 xy＝C 与直线方程：

To ensure any equiaxial hyperbola xy = C with the linear equation:

$$y = kx$$

在整个实平面内有意义，或者说有解。因此，这里有必要将数的范围由实数扩展到复数。
There's a sense, or a solution, in the whole real plane. Therefore, it is necessary here to extend the range of numbers from real numbers to complex numbers.

推论 1. Corollary 1.

在实平面内，常数 C≠0 的任意等轴双曲线函数方程 xy＝C，或 y＝C/x 的定义域和值域，分别是除 x、y≠0 的全体实数。并且在整个实平面内进行围道积分等于 0。
In the real plane, the domain and range of any equiaxial hyperbolic function equation xy = C with constant C≠0, or y = C/x, are all real numbers divided by x and y≠0, respectively. And the integral over the whole real plane is equal to 0.

即是 BBAA　That's

$$\oint (xy)' \ dx = 0 \tag{5.104}$$

式中，x，y≠0；x，y∈R。其中，x 为自变量，y 为因变量。
Where, x, y≠0; x, y∈R. Where x is the independent variable and y is the dependent variable.

证明。在实平面内，对于任意常数 C≠0 的等轴双曲线函数方程：
Proof. In the real plane, for an equiaxial hyperbolic function with arbitrary constant C≠0:

$$xy = C, \text{ or } y = \frac{C}{x} \quad (x, y, C \neq 0; x, y, C \in R) \tag{5.105}$$

很显然，我们可以得到以上等轴双曲线函数方程式(5.105)的自变量和因变量是除 x、y≠0 外的全体实数。也就是以上等轴双曲线函数方程(5.105)的定义域是−∞<x<0 和 0<x<+∞，其值域也是−∞<x<0 和 0<x<+∞，即是除 x、y≠0 外的全体实数。该方程的曲线图象分布在第一象限到第四象限。如图 17 所示。
Obviously, we can get that the independent and dependent variables of the above equiaxial hyperbolic function equation (5.105) are all real numbers except x and y≠0. That is, the definition domain of the above equiaxial hyperbolic function equation (5.105) is −∞<x<0 and 0<x<+∞, and its range is also −∞<x<0 and 0<x<+∞, that is, all the real numbers except x and y≠0. The curves of this equation are distributed in the first quadrant to the fourth quadrant. As shown in Figure 17.

在实平面内，对上式(5.105)隐函数方程左右两边同时进行围道积分，则得

In the real plane, the left and right sides of the implicit function equation of the above equation (5.105) are integrated at the same time, then

$$\int_{+\infty}^{+\infty} (xy)' \ dx = \int_{+\infty}^{+\infty} C' \ dx \tag{5.106}$$

和　And

$$\int_{-\infty}^{-\infty} (xy)' \ dx = \int_{-\infty}^{-\infty} C' \ dx \tag{5.107}$$

将以上两式(5.106)和(5.107)合并表示为：
Combine the above two formulas (5.106) and (5.107) as follows:

$$\oint (xy)' \ dx = \oint C' \ dx \tag{5.107}$$

即得　You get

$$\oint (xy)' \ dx = 0 \tag{5.108}$$

式中，x，y≠0；x，y∈R。其中，x 为自变量，y 为因变量。也就是在实平面内，对于任意等轴双曲线函数方程 xy＝C (x，y，C≠0)进行围道积分等于 0。因此，推论 1 成立。□

Where, x, y≠0; x, y∈R. Where x is the independent variable and y is the dependent variable. That is, in the real plane, for any equiaxial hyperbolic function equation xy = C (x, y, C≠0), the integral is equal to 0. Therefore, Corollary 1 is valid. □

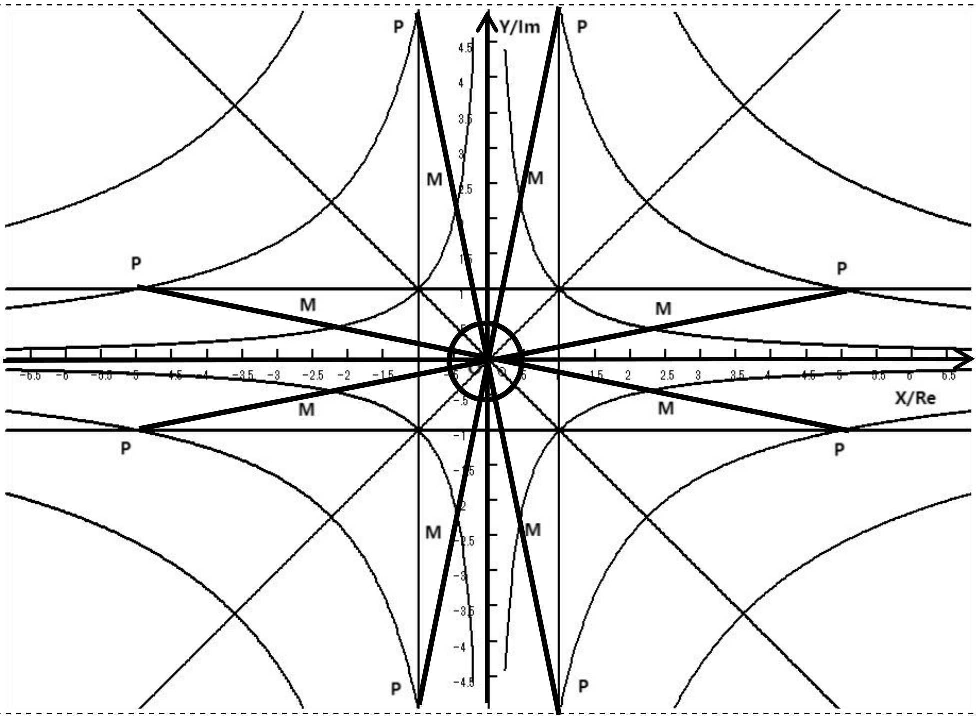

图 17.　黎曼 ζ 函数的等价等轴双曲方程围道积分示意图

Figure 17. Schematic diagram of the perimeter integral of the equivalent equiaxial hyperbolic equation of the Riemann zeta function

推论 2。　Corollary 2.

若有常数 C≠0 的任意等轴双曲线函数方程 xy＝C，将该曲线函数方程的指数进行解析延拓，由 1 扩展到复数 Z'＝a＋ib，并进行围道积分，其函数值总是等于 0。即有

If there is any equiaxial hyperbolic function equation xy = C with constant C≠0, the exponential of the curve function equation is extended from 1 to the complex number Z' = a+ib, and the function value is always equal to 0. Then there is

$$\oint ((xyi)^a e^{ibln(xyi)})' \ dx = \oint (xy)' \ dx = 0 \tag{5.109}$$

式中，x，y≠0；x，y∈R。其中，x 为自变量，y 为因变量。

Where, x, y≠0; x, y∈R. Where x is the independent variable and y is the dependent variable.

也就是，任意等轴双曲线函数方程 xy＝C，解析延拓前后的围道积分总是等于 0。

That is, for any equiaxial hyperbolic function xy = C, the perimeter integral before and after the analytic continuation is always equal to 0.

证明. Proof.

在复平面内，任意等轴双曲线方程又可以进一步表示为：

In the complex plane, the equation of an arbitrary equiaxial hyperbola can be further expressed as

$$xyi = C，\text{or } yi = \frac{C}{x} \quad (x，y \neq 0；x，y，C \in R) \tag{5.110}$$

我们将以上等轴双曲线方程进一步扩展到复数域，即进行解析延拓，同时将式(5.110)的指数取值范围进一步扩展至复数 z'，则得

We further extend the above equiaxial hyperbolic equation to the complex number field, that is, carry out analytical continuation, and further extend the exponential value range of equation (5.110) to the complex number z', then we get

$$(yi)^{z'} = \frac{C^{z'}}{x^{z'}} \tag{5.111}$$

其中， z' = a + ib。并代入上式(5.111)，得

Among them, z' = a + ib. And plug in the above formula (5.111) to get

$$(yi)^{a+ib} = \frac{C^{a+ib}}{x^{a+ib}} \tag{5.112}$$

$$(yi)^a e^{iblny} = \frac{C^{a+ib}}{x^a e^{iblnx}} \tag{5.113}$$

式中：x，y≠0；a，b>0；a，b，x，y，C∈R。

Where: x, y≠0; a, b>0; a, b, x, y, C∈R.

则有 We have

$$(yi)^a e^{iblny} x^a e^{iblnx} = C^{a+ib} \tag{5.114}$$

将上式(5.114)整理，得

Arrange the above formula (5.114) to obtain

$$(xyi)^a e^{ibln(xy)} = C^{a+ib} \tag{5.115}$$

式中：x，y≠0；a，b>0；a，b，x，y∈R。

Where: x, y≠0; a, b>0; a, b, x, y∈R.

当然，也可以就方程

Or, of course, we could just take the equation

$$xyi = C \tag{5.116}$$

同时，若将它的两边指数 1 扩展到复数 Z'＝a＋ib。得，

At the same time, if we extend the exponent 1 on both sides to the complex number Z' = a+ib. All right,

$$(xyi)^{a}e^{ibln(xyi)} = C^{a+ib} \tag{5.117}$$

式中：x，y≠0；a，b>0；a，b，x，y∈R。Where: x, y≠0; a, b>0; a, b, x, y∈R.
现对上式(5.117)隐函数方程左右两边同时进行围道积分，则得
Now the left and right sides of the implicit function equation of the above equation (5.117) are integrated at the same time, then

$$\oint ((xyi)^{a}e^{ibln(xyi)})' \ dx = 0 \tag{5.118}$$

式中：x，y≠0；a，b>0；a，b，x，y∈R。
In the formula: x, y≠0; a, b>0; a, b, x, y∈R.
也就是说，对于任意给定 xy = C 的等轴双曲线函数方程，在复平面内经过解析延拓后，并进行围道积分总是等于零。所以，推论 2 成立。
That is to say, for any given equiaxial hyperbolic function equation, after analytic extension in the complex plane, and the circumference integral is always equal to zero. So corollary 2 is true.
因此，我们再依据推论 1，就可以得到
So, if we follow corollary 1, we get

$$\oint ((xyi)^{a}e^{ibln(xyi)})' \ dx = \oint (xy)' \ dx = 0 \tag{5.119}$$

所以，对于任意等轴双曲线方程：
So, for any equiaxial hyperbolic equation:

$$xy = C，\text{or } y = \frac{C}{x} \quad (x，y \neq 0；x，y，C \in R)$$

在复平面内，将任意等轴双曲线函数方程进行解析延拓前后，并进行围道积分其函数值总是等于 0。
In the complex plane, the function value of any equiaxial hyperbolic function is always equal to 0 after the analytic extension and the circum-path integration.

推论 3. Corollary 3.
在复平面内，若有任意等轴双曲线 xyi＝C，与一条斜率为 k，并且经过坐标原点的直线 yi＝kx，相交点为 M。其中，k 为斜率；C 为常数；x，y，k，C≠0；x，y；k，C∈R。则得以上两个方程曲线相交点 M 的解是除 x，y≠0 的全体复数。并且在复数域内，对该点 M 的轨迹曲线所形成的面积范围进行围道积分等于 0。即
In the complex plane, if there is any equiaxial hyperbola xyi = C, it intersects M with a line yi = kx with slope k and through the origin of the coordinates. Where k is the slope; C is a constant; x, y, k, C≠0; x, y; k, C∈R. Then the solution of M at the intersection of curves of the above two equations is all complex numbers divided by x and y≠0. And in the complex domain, the area range formed by the trajectory curve of the point M is equal to 0. namely

$$\oint (xyi)' \ dx = 0 \tag{5.120}$$

式中，x，y≠0；x，y∈R。其中，x 为自变量，y 为因变量。

Where, x, y≠0; x, y∈R. Where x is the independent variable and y is the dependent variable.

证明。Proof.

由以上两个方程 xyi＝C 和 yi＝kx 组成的联立方程组，可得：

The simultaneous equations composed of the above two equations xyi = C and yi = kx can be obtained:

$$\mathrm{k}x^2 = C \tag{5.121}$$

其中，C 为常数，k 为斜率；x，y，k，C≠0；x，y；k，C∈R。

Where C is the constant and k is the slope; x, y, k, C≠0; x, y; k, C∈R.

解以上方程式，我们可得它们相交点 M 的 x、y 轴坐标值是：

To solve the above equation, we can get the x and y coordinate values of their intersecting points M:

$$\mathrm{x} = \sqrt{\frac{\mathrm{C}}{\mathrm{k}}} \quad , \ \mathrm{y} = \mathrm{k}\sqrt{\frac{\mathrm{C}}{\mathrm{k}}}$$

因此，由此可见，以上 x、y 两值仅在直线斜率 k 与常数 C 取同号时有意义。当直线斜率 k 与常数 C 取异号时，以上 x、y 两坐标值则无实数解。即以上两个方程的图象曲线相交点 M 分布在第一象限和第三象限才有解。如图 17 所示。

Therefore, it can be seen that the above values of x and y are only meaningful if the slope of the line k is the same sign as the constant C. When the slope of the line k and the constant C are different signs, the above x and y coordinates have no real solution. That is, the intersection point M of the image curves of the above two equations is distributed in the first and third quadrants. As shown in Figure 17.

如果我们将以上两个方程组成的联立方程组，其解进一步扩展到复数域，则有联立方程组为：

If we further extend the solution of the simultaneous equations composed of the above two equations to the complex domain, then the simultaneous equations are:

$$\begin{cases} \mathrm{yi} = \mathrm{kx} \\ \mathrm{xyi} = \mathrm{C} \end{cases}$$

可得：You get:

$$\mathrm{k}x^2 = C$$

其中，C 为常数，k 为斜率；x，y，k，C≠0；x，y；k，C∈R。

Where C is the constant and k is the slope; x, y, k, C≠0; x, y; k, C∈R.

解以上方程，我们可得它们相交点 A 在复数域的解是：

To solve the above equation, we can get the solution of their intersection point A in the complex field:

$$\mathrm{x} = \pm\, \mathrm{i}\sqrt{\frac{\mathrm{C}}{\mathrm{k}}} \quad , \ \mathrm{yi} = \pm\, \mathrm{ik}\sqrt{\frac{\mathrm{C}}{\mathrm{k}}}$$

由此可见，在复数域内，以上联立方程组的 x、y 两值，除 k、C≠0 外在复数域内均有解。它的解是除 x、y≠0 的全体复数。即以上两个方程的图象曲线相交点 M 分布在第一象限到第四象限内。共有 4 组解。如图 17 所示。

It can be seen that in the complex domain, the x and y values of the above simultaneous equations have solutions in the external complex domain except k and C≠0. Its solution is all complex numbers divided by x and y≠0. That is, the intersection point M of the image curves of the above two equations is distributed in the first quadrant to the fourth quadrant. There are four sets of solutions. As shown in Figure 17.

如果在复数域内，对上式(5.121)左右两边进行围道积分，则得：

If, in the field of complex numbers, we integrate the left and right sides of the above equation (5.121), we get:

$$\oint (kx^2)'\ dx = \oint C'\ dx \tag{5.122}$$

即得， That's it,

$$\oint (kx^2)'\ dx = 0 \tag{5.123}$$

若再将 yi＝kx 代入上式(5.123)，因此，上式(5.123)也可以表示为：

If yi = kx is substituted into the above equation (5.123), therefore, the above equation (5.123) can also be expressed as:

$$\oint (xyi)'\ dx = 0 \tag{5.124}$$

式中，x，y≠0；x，y∈R。其中，x 为自变量，y 为因变量。I 为虚数单位。 所以，推论 3 成立。□

Where, x, y≠0; x, y∈R. Where x is the independent variable and y is the dependent variable. I is an imaginary unit. So, Corollary 3 is true. □

推论 4。Corollary 4.

若有任意一条斜率为 k 的经过坐标原点的直线 yi＝kx，与指数由 1 扩展到复数 Z'＝a＋ib 的等轴双曲线 xyi＝C 相交点为 M。其中，k 为斜率；C 为常数；x，y，k，C≠0；x，y；k，C∈R。则有

If any line yi = kx with slope k passing through the origin of the coordinates intersects with an equiaxial hyperbola xyi = C whose exponents extend from 1 to the complex Z' = a+ib, the point M is m. Where k is the slope; C is a constant; x, y, k, C≠0; x, y; k, C∈R. Then there is

$$\oint_{\pm\infty}^{\pm\infty} \left((xyi)^a e^{ib\ln(xyi)}\right)'\ dx = 0 \tag{5.125}$$

式中：x，y≠0；a，b>0；a，b，x，y∈R。Where: x, y≠0; a, b>0; a, b, x, y∈R.

即对其相交点 M 形成的轨迹曲线进行围道积分等于 0。

That is, the circumferential integral of the trajectory curve formed by its intersection point M is equal to 0.

证明. Proof.

在复平面内，任意等轴双曲线方程可以表示为：

In the complex plane, any equiaxial hyperbolic equation can be expressed as:

$$xyi = C，\text{or } yi = \frac{C}{x}\quad (x，y \neq 0；x，y，C \in R) \tag{5.126}$$

若将它的指数 1 扩展到复数 Z'＝a＋ib。即得，

If we extend its exponent 1 to the complex number Z' = a+ib. If you have it,

$$(xyi)^a e^{ibln(xyi)} = C^{a+ib} \tag{5.127}$$

其次，假设有任意一条斜率为 k 的经过坐标原点的直线 yi＝kx，与等轴双曲线 xyi＝C 相交点为 M。其中，k 为斜率；C 为常数；x，y，k，C≠0；x，y；k，C∈R。得：

Secondly, suppose that any straight line yi = kx with slope k passing through the origin of the coordinates intersects the equiaxial hyperbola xyi = C at a point M. Where k is the slope; C is a constant; x, y, k, C≠0; x, y; k, C∈R. Received:

$$(kx^2)^a e^{iln(kx^2)^b} = C^{a+ib} \tag{5.128}$$

对上式(5.128)隐函数左右两边同时进行围道积分，即从＋∞开始沿 X 轴绕过坐标系原点 O 再沿 X 轴回到＋∞；或者从−∞开始沿 X 轴绕过坐标系原点 O 再沿 X 轴回到－∞。

The left and right sides of the implicit function of the above equation (5.128) are integrated at the same time, that is, starting from ＋∞, bypasses the coordinate system origin O along the X-axis and returns to ＋∞ along the X-axis; Or start at −∞ and go around the origin O on the X-axis and go back to －∞ on the X-axis.

即有 immediate

$$\oint_{\pm\infty}^{\pm\infty} ((kx^2)^a e^{ibln(kx^2)})' \ dx = \oint_{\pm\infty}^{\pm\infty} (C^{a+ib})' \ dx \tag{5.129}$$

可得 acquirability

$$\oint_{\pm\infty}^{\pm\infty} ((kx^2)^a \ e^{ibln(kx^2)})' \ dx = 0dx \tag{5.130}$$

所以，得 So, have

$$\oint_{\pm\infty}^{\pm\infty} ((kx^2)^a e^{ibln(kx^2)})' \ dx = 0 \tag{5.131}$$

式中：x，y≠0；a，b>0；a，b，x，y∈R。

Where: x, y≠0; a, b>0; a, b, x, y∈R.

由于 On account of

yi＝kx

将上式代入，可得

If you plug in the above formula, you get

$$\oint_{\pm\infty}^{\pm\infty} ((xyi)^a e^{ibln(xyi)})' \ dx = 0 \tag{5.132}$$

式中：x，y≠0；a，b>0；a，b，x，y∈R。 Where: x, y≠0; a, b>0; a, b, x, y∈R.

所以，推论 4 成立。 □ So, Corollary 4 is true. □

凡是等轴双曲线 xy＝C 方程，经过解析延拓后，在复平面内满足以上推论 4 的动点 M，作者称之为非平凡零点。因此，非平凡零点有无穷多。其对应的零点复数作者称之为非平凡零点复数。

Every equiaxial hyperbola xy = C equation, after analytical extension, satisfies the moving point M of the above inference 4 in the complex plane, the author calls it nontrivial zero. Therefore, there are infinitely many nontrivial zeros. The corresponding null complex number is called nontrivial null complex number by the authors.

推论 5。Corollary 5.

若 P 是实部或者 X 轴等于 1 上的任意一个有序素数，n 是虚部或者 Y 轴等于 1 上的任意一个自然数，并且分别满足等轴双曲线方程 xy＝1，当某个素数等于某一个自然数时，则有恒等式：

If P is the real part or the X-axis is equal to any ordered prime number on 1, and n is the imaginary part or the Y-axis is equal to any natural number on 1, and respectively satisfy the equiaxial hyperbolic equation xy = 1, when a prime number is equal to some natural number, then there is the identity:

$$xy = \frac{1}{\sqrt{P}} \times \sqrt{n} \times \frac{1}{\sqrt{n}} \times \sqrt{P} \equiv 1$$

式中：x，y>0；x，y∈R。P，n∈N^*。以上 P 为有序素数，P≠1。n 为非零自然数。

Where: x, y>0; x, y∈R. P, n∈. The above P is an ordered prime number, P≠1. n is a non-zero natural number.

证明。Proof.

对于当常数 C＝1 的等轴双曲线方程为：

For the equiaxial hyperbolic equation when the constant C = 1 is:

$$xy = 1，\text{or } y = \frac{1}{x} \quad (x，y > 0；x，y \in R)$$

若有任意一条斜率为素数 P 的经过坐标原点的直线 y＝Px，与等轴双曲线 xy＝1 相交点为 M。

If any line y = Px with a slope of prime P passes through the origin of the coordinates, the point of intersection with the equiaxial hyperbola xy = 1 is M.

其中，P 为斜率。x，y>0；x，y；P∈R。解由 xy = 1 和 y＝Px 组成的联立方程组，则得：

Where P is the slope. x, y>0; x, y; P∈R. To solve the simultaneous equations composed of and y = Px, we obtain:

$$x = \frac{1}{\sqrt{P}}，y = \sqrt{P}$$

因此，可得 Therefore, available

$$xy = \frac{1}{\sqrt{P}} \times \sqrt{P} = 1 \tag{5.133}$$

若有任意一条斜率为正整数 n 的经过坐标原点的直线 y＝nx，与等轴双曲线 xy＝1 相交点为 M'。其中，n 为斜率。x，y>0；x，y；n∈R。解由 xy = 1 和 y＝nx 组成的联立方程组，则得：

If any line y = nx with a positive integer n passes through the origin of the coordinates, the point at which it intersects the equiaxial hyperbola xy = 1 is M'. Where n is the slope. x, y>0; x, y; n∈R. To solve the simultaneous equations composed of and y = nx, we obtain:

$$x' = \frac{1}{\sqrt{n}}，y' = \sqrt{n}$$

因此，可得 Therefore, available

$$1=\frac{1}{\sqrt{n}}\times\sqrt{n}=x'y' \tag{5.134}$$

当 P=n 时，以上两式(5.133)和(5.134)左右两边分别相乘，得：
When P＝n, the left and right sides of the above two formulas (5.133) and (5.134) are multiplied respectively to obtain:

$$1=xy=\frac{1}{\sqrt{P}}\times\sqrt{n}\times\frac{1}{\sqrt{n}}\times\sqrt{P}=x'y'=1$$

即得，If you have it,

$$xy=\frac{1}{\sqrt{P}}\times\sqrt{n}\times\frac{1}{\sqrt{n}}\times\sqrt{P}\equiv 1$$

式中：x，y>0；x，y∈R。P，n∈N^* 。Where: x, y>0; x, y∈R. P, n∈N^*.
以上推论 5 所得的结果表明，黎曼ζ函数的等价方程是依据素数 1 恒等于自然数 1 的最原始数学公理为前提而成立。

The result of the above inference 5 shows that the equivalent equation of the Riemann zeta function is based on the most primitive mathematical axiom that the prime number 1 is identical to the natural number 1.
因此，也可以用数学式简单表示为：1≡1。□
Therefore, it can also be simply expressed in mathematical formula as: 1≡1. □

综上所述，本研究论文作者基于有序素数通项公式的首次发现，并且据此推导出每个有序素数均有三个非平凡零点复数：

In summary, based on the first discovery of the general term formula of ordered prime numbers, the author of this research paper deduced that every ordered prime number has three nontrivial complex zeros:

$$Z'=\frac{1}{2}+\frac{P_m}{2}i$$

$$Z_1=\frac{1}{2}+im，Z_2=\frac{1}{2}+iS_m$$

并且这三个非平凡零点复数的实部都等于 1/2。也就是说黎曼猜想的所有素数信息都在实部等于 1/2。
And the real part of these three nontrivial zeros is equal to 1/2. That is to say, all the prime information in the Riemann conjecture is equal to 1/2 in the real part.

其次，是将非平凡零点 G 复数直接代入最初的黎曼ζ函数进行验证黎曼ζ函数成立。即将

Secondly, the non-trivial zeros G complex number is substituted directly into the original Riemann-zeta function to verify the validity of the Riemann-zeta function. Be about to

$$s=Z'=\frac{1}{2}+i\frac{P}{2}$$

代入原始的黎曼ζ函数
Plug in the original Riemann zeta function

$$\zeta(s)=\prod_{p}^{\infty}\left(1-\frac{1}{p^{s}}\right)^{-1}=\sum_{n}^{\infty}\frac{1}{n^{s}}$$

并整理和推理，可得到黎曼ζ函数的中间等价方程是常数等于 1 等轴双曲线方程：

The intermediate equivalent equation of the Riemann zeta function is the hyperbolic equation with constant equal to 1:

$$\zeta(s)=xy=\prod_{p}^{\infty}\left(\frac{1}{1-\frac{1}{\sqrt{P}}e^{-i\frac{p}{2}lnp}}\right)=\sum_{n}^{\infty}\frac{1}{\sqrt{n}}e^{-i\frac{p}{2}lnn}=1$$

也可以表示为：

It can also be expressed as:

$$\frac{1}{\prod_{p=2}^{\infty}\left(1-\frac{1}{\sqrt{P}}e^{-i\frac{p}{2}lnp}\right)}=(\zeta(s)=xyi=1)=\sum_{n}^{\infty}\frac{1}{\sqrt{n}}e^{-i\frac{p}{2}lnn}$$

第三，对于黎曼ζ函数的中间等价等轴双曲线方程，则有

Third, for the intermediate equivalent equiaxial hyperbolic equation of the Riemann zeta function, there is

$$\zeta(s)=xyi=1$$

对上式左右两边同时进行围道积分，即得

If you integrate both sides of the above equation at the same time, you get

$$\oint(xyi)'\ dx=0$$

也就是， That is,

$$\oint\zeta(s)'\ dx=0$$

式中：x，y≠0；x，y∈R。Where: x, y≠0; x, y∈R.

至此，黎曼ζ函数的等价方程围道积分等于零，因此，黎曼猜想最终被证明成立。□

At this point, the equivalent equation of the Riemann zeta function is equal to zero, so the Riemann conjecture is finally proved to be true. □

这里需要特别提示的是，当 x＝1 时，解以上方程，则得 y＝k＝C。并且 y，k，C 必为整数。当 x≠1 时，则有 y≠k≠C。并且 y，k，C 必为非整数。可得，

$$xy=C，\text{or } x^{2}=\frac{C}{k}$$

其中，k 为斜率，C>0，C 为常数；x，y；k，C∈R。

因此，当前主流数学界排除自然单位数 1，为素数。则必然得到黎曼非平凡零点ζ函数 BBAAs＝δ＋it 的虚部为小数，除 t≡1(mod2)外。

那么，黎曼ζ函数的那些非平凡零点，它们究竟在哪里呢？

So, where are the nontrivial zeros of the Riemann zeta function?

为此，作者认为黎曼猜想提出的黎曼ζ函数所有非凡零点应该就是每个素数均有的三个非平凡复数点：

For this reason, the author argues that all the extraordinary zeros of the Riemann zeta function proposed by the Riemann conjecture should be the three nontrivial complex points of every prime number:

$$Z' = \frac{1}{2} + \frac{P_m}{2} i$$

$$Z_1 = \frac{1}{2} + im，Z_2 = \frac{1}{2} + iS_m$$

并且，每个非平凡点复数Z_1、Z_2 and Z'的实部是 1/2，而虚部分别是素数P_m的序数 m 和前 m 项合数个数的和S_m，则 m、S_m必是正整数，或者$(m + S_m)$必是模 2 余数为 1 (mod2)的正整数。

Moreover, if the real part of every nontrivial point complex Z_1, Z_2 and Z' is 1/2, and the imaginary part is the sum of the ordinal m of the prime P_m and the composite numbers of the preceding m terms S_m, then m and S_m must be positive integers, or $(m+S_m)$ must be positive integers of modulo 2 with a remainder of 1 (mod2).

但是，自 1859 年，黎曼提出黎曼猜想，直到 1903 年(即黎曼的论文发表后的第 44 个年头)，丹麦数学家格拉姆（Gorgen Gram，1850-1916）才首次公布了对黎曼ζ(s)函数前 15 个非平凡零点的计算结果[7]。验证了ζ(s)的前 15 个非平凡零点都落在直线 Re s＝1/2 上。在这 15 个零点中，格拉姆对前 10 个零点计算到了小数点后第六位，而后 5 个零点——由于计算繁复程度的增加一-只计算到了小数点后第一位。与此同时，我们也列出了这 15 个零点的现代计算值（保留到小数点后第七位），以便大家了解格拉姆计算的精度。如表 6 所示。

However, after Riemann proposed the Riemann conjecture in 1859, it was not until 1903 (44 years after Riemann's paper was published) that the Danish mathematician Gorgen Gram (1850-1916) first published the results of the calculation of the first 15 nontrivial zeros of the Riemann ζ(s) function[7]. It is verified that the first 15 nontrivial zeros of ζ(s) all fall on the line Re s = 1/2. Of the 15 zeros, Gram calculated the first 10 zeros to the sixth decimal place, and the last five zeros - due to an increase in complexity - to the first decimal place. At the same time, we have also listed the modern calculated values of these 15 zeros (retained to the seventh decimal place), so that you can understand the accuracy of Gram's calculation. As shown in Table 6.

表 6. 黎曼ζ函数的前 15 个非平凡零点。

Table 6. The first 15 nontrivial zeros of the Riemann Zeta function.

零点序号 Zero sequence number	格拉姆的零点数值 The zero value of Gram	现代数值 Modern value	
1	1/2+14.134725i	1/2+14. 134 725 1i	
2	1/2+21. 022 040i	1/2+21.0220396i	
3	1/2+25. 010856i	1/2+25. 010857 5i	

4	1/2+30.424878i	1/2+30.4248761i	
5	1/2+32.935057i	1/2+32. 9350615i	
6	1/2+37. 586 176i	1/2+37.5861781i	
7	1/2+40. 918 720i	1/2+40. 918 719 0i	
8	1/2+43. 327 073i	1/2+43.3270732i	
9	1/2+48.005150i	1/2+48.0051508i	
10	1/2+49. 773832i	1/2+49. 773832 4i	
11	1/2+52. 8i	1/2+52. 970 321 4i	
12	1/2+56. 4i	1/2+56. 446 247 6i	
13	1/2+59.4i	1/2+59. 347 044 0i	
14	1/2+61. 0i	1/2+60. 831 778 5i	
15	1/2+65. 0i	1/2+65. 112 544 0i	

据文献资料[7]，在格拉姆之后，贝可隆（Ralf JosefBacklund,1888-1949）于 1914 年把对零点的计算推进到了前 79 个零点。再往后，经过哈代、利特尔伍德、美国数学家哈钦森（John Hutchinson，1867-1935）等人的努力（包括计算方法上的一些改进一一但主体上仍使用欧拉-麦克劳林公式)，到了 1925 年，人们计算出了前 138 个零点，它们全都位于黎曼猜想所预言的临界线上。1968 年，美国的三位数学家证明了ζ(s)的前 350 万个非平凡零点都落在直线 Re s＝1/2 上；后来勃赖特(Brent)的计算证实了ζ(s)的前 8100 万个非平凡零点都落在直线 Re s＝1/2 上；1986 年，范德隆(Van de Lune)和黎勒(Riele)合作计算了ζ(s)的前 1 500 000 001 个非平凡零点，到 2001 年，他们已经把数值推进到了 100 亿。虽然，到目前还没有发现黎曼猜想的任何一个反例。但是，这些文献资料给复数 $s = \sigma + it$ 的实部 t 值大多数都是小数，几乎很少是正整数。因此，黎曼猜想的具体数学证明形式和方法，非常值得数学家去深入研究和探讨。

According to literature[7], after Gramm, Ralf JosefBacklund (1888-1949) advanced the calculation of zeros to the first 79 zeros in 1914. Later, through the efforts of Hardy, Littlewood, the American mathematician John Hutchinson (1867-1935) and others (including some improvements in the calculation method - but still largely using the Euler-mclaughlin formula), by 1925 the first 138 zeros had been calculated. They all lie on the critical boundary predicted by the Riemann conjecture. In 1968, three mathematicians in the United States proved that the first 3.5 million nontrivial zeros of ζ(s) fall on the line Re s = 1/2; Brent's calculations later confirmed that the first 81 million nontrivial zeros of ζ(s) all fall on the line Re s = 1/2; In 1986, Van de Lune and Riele worked together to calculate the first 1,500,001 nontrivial zeros of ζ(s), and by 2001 they had pushed the number up to 10 billion. So far, though, no counterexample to Riemann's

Conjecture has been found. However, the real part T-values given by these sources to the complex number $s=\sigma+it$ are mostly decimals and rarely positive integers. Therefore, the concrete mathematical proof forms and methods of Riemann conjecture are very worthy of in-depth study and discussion by mathematicians.

§6 结论

§6 Conclusions

本研究论文基于有序素数通项表达公式的首次发现，直接巧妙地证明了每个有序素数都有三个非平凡零点复数。即

Based on the first discovery of the general term expression formula of ordered prime numbers, this paper directly and skillfully proves that every ordered prime number has three nontrivial zero complex numbers. namely

$$Z' = \frac{1}{2} + \frac{P_m}{2} i$$

$$Z_1 = \frac{1}{2} + im，Z_2 = \frac{1}{2} + iS_m$$

其中，第一个非凡零点是与素数相关的有序素数数列的序数 m；第二个非凡零点是有序素数数列的特征级数函数S_m；第三个非凡零点是复数素数$z_m = 1 + iP_m$的中点，也就是素数平行四边形分解的中点 G。这三个非平凡零点复数都分布在实部等于 1/2 的直线上。并且这三个非平凡零点分布与素数的分布有关。

Among them, the first extraordinary zero is the ordinal m of the sequence of ordered prime numbers related to prime numbers; The second extraordinary zero is the characteristic series function S_m of an ordered sequence of prime numbers; The third extraordinary zero is the midpoint of the complex prime $z_m = 1 + iP_m$, which is the midpoint G of the parallelogram decomposition of the prime. These three nontrivial zeros are all distributed over a line with a real part equal to 1/2. And the distribution of these three nontrivial zeros is related to the distribution of prime numbers.

同时，又将本论文研究结果 $s = Z' = \sigma + it = \frac{1}{2} + \frac{p}{2} i$，代入黎曼猜想给出的原始数学表达形式，即黎曼ζ函数

At the same time, the results of this paper $s = Z' = \sigma + it = \frac{1}{2} + \frac{p}{2} i$, are substituted into the original mathematical expression of Riemann conjecture, namely the Riemann zeta function

$$\zeta(s) = \sum_n \frac{1}{n^s} = \prod_p \left(1 - \frac{1}{p^s}\right)^{-1} = xy = 1$$

其中，Among them, $s = \frac{1}{2} + \frac{p}{2} i$.

进一步验证了黎曼猜想是成立的。也就是，黎曼ζ(s)函数解析延拓后对于整个复平面围道积分，它的结果总是等于 0。即是，

It is further verified that Riemann conjecture is valid. That is, the analytic extension of the Riemann ζ(s) function always results in zero for the entire complex plane perimeter integral. That is,

$$\oint \zeta(s)' \quad dx = 0$$

式中：x，y≠0；x，y∈R。Where: x, y≠0; x, y∈R.
所以，黎曼猜想被证明成立。
So, the Riemann conjecture turns out to be true.

尤其有趣的是，按照本法推理最终可得到的结果总是单位素数 1 恒等于单位自然数 1，即用数学式可表示为："1≡1"公理。反之，若以恒等式 1≡1 逆向反推也可以得到黎曼 ζ 函数：

It is particularly interesting that the ultimate result of reasoning according to this method is always the identity prime 1 is identical to the identity natural number 1, which can be expressed mathematically as the axiom "1≡1". Conversely, the Riemann-zeta function can also be obtained by inverting the identity 1≡1:

$$\zeta(s) = \sum_{n} \frac{1}{n^s} = \prod_{p} \left(1 - \frac{1}{p^s}\right)^{-1} = xy = 1$$

成立。因此足见本证明方法是正确的。所以，本证明方法作者又通俗形象地称之为黎曼猜想的"1≡1"证明法。
Established. Therefore, this proof method is correct. Therefore, the author of this proof method is also colloquially called "1≡1" proof of Riemann conjecture.

至此，自 1859 年黎曼提出的黎曼 ζ (s)函数，存在复数 s，这个复数就是 $s = \sigma + it = \frac{1}{2} + \frac{p}{2}i$。其中：P 为所有素数(这里 p≠1)。并且它满足黎曼 ζ (s)函数所有非凡零点都分布在实部等于 1/2 的直线上。也就是说，黎曼 ζ (s)函数的非平凡零点分布与素数的分布有关。与素数相关的信息要么就是正整数，要么就是模 2 余 1 的正整数(1mod2)。但是，据现有的文献资料，主流数学研究，得到的 t 值大多数是小数。

Since Riemann proposed the Riemann ζ(s) function in 1859, there has been a complex number s, which is $s = \sigma + it = \frac{1}{2} + \frac{p}{2}i$. Where: P is all prime numbers (where p≠1). And it satisfies that all extraordinary zeros of the Riemann ζ(s) function are distributed on a line whose real part is equal to 1/2. In other words, the distribution of nontrivial zeros of the Riemann ζ(s) function is related to the distribution of prime numbers. The information associated with prime numbers is either a positive integer or a positive integer modulo 2 co 1 (1mod2). However, according to the existing literature and mainstream mathematical research, most of the T-values obtained are decimal.

本论文研究得到的结果是 t＝P/2，并且为模 2 余 1 的正整数(1mod2)。不可能是其他小数。因此，这里作者认为黎曼猜想的 ζ 函数具体数学表达形式和研究方法，以及文中提出的关于有序素数的特征级数函数数学命题，还有待于数学界共同努力，去深入研究和探讨。

The results obtained in this paper are t = P/2, and it is a positive integer (1mod2) of module 2 co1. It can't be any other decimal. Therefore, the author believes that the specific mathematical expression and research method of the zeta function of Riemann conjecture, as well as the mathematical proposition of the characteristic series function of ordered prime numbers proposed in this paper, need to be studied and discussed by the mathematical community.

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表 7：非零自然数 10000 以内的有序素数的相关变量和非平凡零点复数表(素数 1230 个)
Table 7: Correlation variables and complex number of nontrivial zeros for ordered primes within 10000 (1230 primes)

m	S_m	prime number (P_m)	A complex number of three nontrivial zeros on a line with a real part of 1/2 for each prime number		
			$Z_1=\frac{1}{2}+mi$	$Z_2=\frac{1}{2}+iS_m$	$S=Z'=\frac{1}{2}+\frac{P_m}{2}i$
1	0	1	$Z_1=1/2+1i$	$Z_2=1/2+0i$	$Z'=1/2+0.5i$
2	0	2	$Z_1=1/2+2i$	$Z_2=1/2+0i$	$Z'=1/2+1i$
3	0	3	$Z_1=1/2+3i$	$Z_2=1/2+0i$	$Z'=1/2+1.5i$
4	1	5	$Z_1=1/2+4i$	$Z_2=1/2+1i$	$Z'=1/2+2.5i$
5	2	7	$Z_1=1/2+5i$	$Z_2=1/2+2i$	$Z'=1/2+3.5i$
6	5	11	$Z_1=1/2+6i$	$Z_2=1/2+5i$	$Z'=1/2+5.5i$
7	6	13	$Z_1=1/2+7i$	$Z_2=1/2+6i$	$Z'=1/2+6.5i$
8	9	17	$Z_1=1/2+8i$	$Z_2=1/2+9i$	$Z'=1/2+8.5i$
9	10	19	$Z_1=1/2+9i$	$Z_2=1/2+10i$	$Z'=1/2+9.5i$
10	13	23	$Z_1=1/2+10i$	$Z_2=1/2+13i$	$Z'=1/2+11.5i$
11	18	29	$Z_1=1/2+11i$	$Z_2=1/2+18i$	$Z'=1/2+14.5i$
12	19	31	$Z_1=1/2+12i$	$Z_2=1/2+19i$	$Z'=1/2+15.5i$
13	24	37	$Z_1=1/2+13i$	$Z_2=1/2+24i$	$Z'=1/2+18.5i$
14	27	41	$Z_1=1/2+14i$	$Z_2=1/2+27i$	$Z'=1/2+20.5i$
15	28	43	$Z_1=1/2+15i$	$Z_2=1/2+28i$	$Z'=1/2+21.5i$
16	31	47	$Z_1=1/2+16i$	$Z_2=1/2+31i$	$Z'=1/2+23.5i$
17	36	53	$Z_1=1/2+17i$	$Z_2=1/2+36i$	$Z'=1/2+26.5i$

18	41	59	$Z_1=1/2+18i$	$Z_2=1/2+41i$	$Z'=1/2+29.5i$
19	42	61	$Z_1=1/2+19i$	$Z_2=1/2+42i$	$Z'=1/2+30.5i$
20	47	67	$Z_1=1/2+20i$	$Z_2=1/2+47i$	$Z'=1/2+33.5i$
21	50	71	$Z_1=1/2+21i$	$Z_2=1/2+50i$	$Z'=1/2+35.5i$
22	51	73	$Z_1=1/2+22i$	$Z_2=1/2+51i$	$Z'=1/2+36.5i$
23	56	79	$Z_1=1/2+23i$	$Z_2=1/2+56i$	$Z'=1/2+39.5i$
24	59	83	$Z_1=1/2+24i$	$Z_2=1/2+59i$	$Z'=1/2+41.5i$
25	64	89	$Z_1=1/2+25i$	$Z_2=1/2+64i$	$Z'=1/2+44.5i$
26	71	97	$Z_1=1/2+26i$	$Z_2=1/2+71i$	$Z'=1/2+48.5i$
27	74	101	$Z_1=1/2+27i$	$Z_2=1/2+74i$	$Z'=1/2+50.5i$
28	75	103	$Z_1=1/2+28i$	$Z_2=1/2+75i$	$Z'=1/2+51.5i$
29	78	107	$Z_1=1/2+29i$	$Z_2=1/2+78i$	$Z'=1/2+53.5i$
30	79	109	$Z_1=1/2+30i$	$Z_2=1/2+79i$	$Z'=1/2+54.5i$
31	82	113	$Z_1=1/2+31i$	$Z_2=1/2+82i$	$Z'=1/2+56.5i$
32	95	127	$Z_1=1/2+32i$	$Z_2=1/2+95i$	$Z'=1/2+63.5i$
33	98	131	$Z_1=1/2+33i$	$Z_2=1/2+98i$	$Z'=1/2+65.5i$
34	103	137	$Z_1=1/2+34i$	$Z_2=1/2+103i$	$Z'=1/2+68.5i$
35	104	139	$Z_1=1/2+35i$	$Z_2=1/2+104i$	$Z'=1/2+69.5i$
36	113	149	$Z_1=1/2+36i$	$Z_2=1/2+113i$	$Z'=1/2+74.5i$
37	114	151	$Z_1=1/2+37i$	$Z_2=1/2+114i$	$Z'=1/2+75.5i$
38	119	157	$Z_1=1/2+38i$	$Z_2=1/2+119i$	$Z'=1/2+78.5i$
39	124	163	$Z_1=1/2+39i$	$Z_2=1/2+124i$	$Z'=1/2+81.5i$

40	127	167	$Z_1=1/2+40i$	$Z_2=1/2+127i$	$Z'=1/2+83.5i$
41	132	173	$Z_1=1/2+41i$	$Z_2=1/2+132i$	$Z'=1/2+86.5i$
42	137	179	$Z_1=1/2+42i$	$Z_2=1/2+137i$	$Z'=1/2+89.5i$
43	138	181	$Z_1=1/2+43i$	$Z_2=1/2+138i$	$Z'=1/2+90.5i$
44	147	191	$Z_1=1/2+44i$	$Z_2=1/2+147i$	$Z'=1/2+95.5i$
45	148	193	$Z_1=1/2+45i$	$Z_2=1/2+148i$	$Z'=1/2+96.5i$
46	151	197	$Z_1=1/2+46i$	$Z_2=1/2+151i$	$Z'=1/2+98.5i$
47	152	199	$Z_1=1/2+47i$	$Z_2=1/2+152i$	$Z'=1/2+99.5i$
48	163	211	$Z_1=1/2+48i$	$Z_2=1/2+163i$	$Z'=1/2+105.5i$
49	174	223	$Z_1=1/2+49i$	$Z_2=1/2+174i$	$Z'=1/2+111.5i$
50	177	227	$Z_1=1/2+50i$	$Z_2=1/2+177i$	$Z'=1/2+113.5i$
51	178	229	$Z_1=1/2+51i$	$Z_2=1/2+178i$	$Z'=1/2+114.5i$
52	181	233	$Z_1=1/2+52i$	$Z_2=1/2+181i$	$Z'=1/2+116.5i$
53	186	239	$Z_1=1/2+53i$	$Z_2=1/2+186i$	$Z'=1/2+119.5i$
54	187	241	$Z_1=1/2+54i$	$Z_2=1/2+187i$	$Z'=1/2+120.5i$
55	196	251	$Z_1=1/2+55i$	$Z_2=1/2+196i$	$Z'=1/2+125.5i$
56	201	257	$Z_1=1/2+56i$	$Z_2=1/2+201i$	$Z'=1/2+128.5i$
57	206	263	$Z_1=1/2+57i$	$Z_2=1/2+206i$	$Z'=1/2+131.5i$
58	211	269	$Z_1=1/2+58i$	$Z_2=1/2+211i$	$Z'=1/2+134.5i$
59	212	271	$Z_1=1/2+59i$	$Z_2=1/2+212i$	$Z'=1/2+135.5i$
60	217	277	$Z_1=1/2+60i$	$Z_2=1/2+217i$	$Z'=1/2+138.5i$
61	220	281	$Z_1=1/2+61i$	$Z_2=1/2+220i$	$Z'=1/2+140.5i$

62	221	283	$Z_1=1/2+62i$	$Z_2=1/2+221i$	$Z'=1/2+141.5i$
63	230	293	$Z_1=1/2+63i$	$Z_2=1/2+230i$	$Z'=1/2+146.5i$
64	243	307	$Z_1=1/2+64i$	$Z_2=1/2+243i$	$Z'=1/2+153.5i$
65	246	311	$Z_1=1/2+65i$	$Z_2=1/2+246i$	$Z'=1/2+155.5i$
66	247	313	$Z_1=1/2+66i$	$Z_2=1/2+247i$	$Z'=1/2+156.5i$
67	250	317	$Z_1=1/2+67i$	$Z_2=1/2+250i$	$Z'=1/2+158.5i$
68	263	331	$Z_1=1/2+68i$	$Z_2=1/2+263i$	$Z'=1/2+165.5i$
69	268	337	$Z_1=1/2+69i$	$Z_2=1/2+268i$	$Z'=1/2+168.5i$
70	277	347	$Z_1=1/2+70i$	$Z_2=1/2+277i$	$Z'=1/2+173.5i$
71	278	349	$Z_1=1/2+71i$	$Z_2=1/2+278i$	$Z'=1/2+174.5i$
72	281	353	$Z_1=1/2+72i$	$Z_2=1/2+281i$	$Z'=1/2+176.5i$
73	286	359	$Z_1=1/2+73i$	$Z_2=1/2+286i$	$Z'=1/2+179.5i$
74	293	367	$Z_1=1/2+74i$	$Z_2=1/2+293i$	$Z'=1/2+183.5i$
75	298	373	$Z_1=1/2+75i$	$Z_2=1/2+298i$	$Z'=1/2+186.5i$
76	303	379	$Z_1=1/2+76i$	$Z_2=1/2+303i$	$Z'=1/2+189.5i$
77	306	383	$Z_1=1/2+77i$	$Z_2=1/2+306i$	$Z'=1/2+191.5i$
78	311	389	$Z_1=1/2+78i$	$Z_2=1/2+311i$	$Z'=1/2+194.5i$
79	318	397	$Z_1=1/2+79i$	$Z_2=1/2+318i$	$Z'=1/2+198.5i$
80	321	401	$Z_1=1/2+80i$	$Z_2=1/2+321i$	$Z'=1/2+200.5i$
81	328	409	$Z_1=1/2+81i$	$Z_2=1/2+328i$	$Z'=1/2+204.5i$
82	337	419	$Z_1=1/2+82i$	$Z_2=1/2+337i$	$Z'=1/2+209.5i$
83	338	421	$Z_1=1/2+83i$	$Z_2=1/2+338i$	$Z'=1/2+210.5i$

84	347	431	$Z_1=1/2+84i$	$Z_2=1/2+347i$	$Z'=1/2+215.5i$
85	348	433	$Z_1=1/2+85i$	$Z_2=1/2+348i$	$Z'=1/2+216.5i$
86	353	439	$Z_1=1/2+86i$	$Z_2=1/2+353i$	$Z'=1/2+219.5i$
87	356	443	$Z_1=1/2+87i$	$Z_2=1/2+356i$	$Z'=1/2+221.5i$
88	361	449	$Z_1=1/2+88i$	$Z_2=1/2+361i$	$Z'=1/2+224.5i$
89	368	457	$Z_1=1/2+89i$	$Z_2=1/2+368i$	$Z'=1/2+228.5i$
90	371	461	$Z_1=1/2+90i$	$Z_2=1/2+371i$	$Z'=1/2+230.5i$
91	372	463	$Z_1=1/2+91i$	$Z_2=1/2+372i$	$Z'=1/2+231.5i$
92	375	467	$Z_1=1/2+92i$	$Z_2=1/2+375i$	$Z'=1/2+233.5i$
93	386	479	$Z_1=1/2+93i$	$Z_2=1/2+386i$	$Z'=1/2+239.5i$
94	393	487	$Z_1=1/2+94i$	$Z_2=1/2+393i$	$Z'=1/2+243.5i$
95	396	491	$Z_1=1/2+95i$	$Z_2=1/2+396i$	$Z'=1/2+245.5i$
96	403	499	$Z_1=1/2+96i$	$Z_2=1/2+403i$	$Z'=1/2+249.5i$
97	406	503	$Z_1=1/2+97i$	$Z_2=1/2+406i$	$Z'=1/2+251.5i$
98	411	509	$Z_1=1/2+98i$	$Z_2=1/2+411i$	$Z'=1/2+254.5i$
99	422	521	$Z_1=1/2+99i$	$Z_2=1/2+422i$	$Z'=1/2+260.5i$
100	423	523	$Z_1=1/2+100i$	$Z_2=1/2+423i$	$Z'=1/2+261.5i$
101	440	541	$Z_1=1/2+101i$	$Z_2=1/2+440i$	$Z'=1/2+270.5i$
102	445	547	$Z_1=1/2+102i$	$Z_2=1/2+445i$	$Z'=1/2+273.5i$
103	454	557	$Z_1=1/2+103i$	$Z_2=1/2+454i$	$Z'=1/2+278.5i$
104	459	563	$Z_1=1/2+104i$	$Z_2=1/2+459i$	$Z'=1/2+281.5i$
105	464	569	$Z_1=1/2+105i$	$Z_2=1/2+464i$	$Z'=1/2+284.5i$

106	465	571	Z_1＝1/2＋106i	Z_2＝1/2＋465i	Z'＝1/2＋285.5i
107	470	577	Z_1＝1/2＋107i	Z_2＝1/2＋470i	Z'＝1/2＋283.5i
108	479	587	Z_1＝1/2＋108i	Z_2＝1/2＋479i	Z'＝1/2＋293.5i
109	484	593	Z_1＝1/2＋109i	Z_2＝1/2＋484i	Z'＝1/2＋296.5i
110	489	599	Z_1＝1/2＋110i	Z_2＝1/2＋489i	Z'＝1/2＋299.5i
111	490	601	Z_1＝1/2＋111i	Z_2＝1/2＋490i	Z'＝1/2＋300.5i
112	495	607	Z_1＝1/2＋112i	Z_2＝1/2＋495i	Z'＝1/2＋303.5i
113	500	613	Z_1＝1/2＋113i	Z_2＝1/2＋500i	Z'＝1/2＋306.5i
114	503	617	Z_1＝1/2＋114i	Z_2＝1/2＋503i	Z'＝1/2＋308.5i
115	504	619	Z_1＝1/2＋115i	Z_2＝1/2＋504i	Z'＝1/2＋309.5i
116	515	631	Z_1＝1/2＋116i	Z_2＝1/2＋515i	Z'＝1/2＋315.5i
117	524	641	Z_1＝1/2＋117i	Z_2＝1/2＋524i	Z'＝1/2＋320.5i
118	525	643	Z_1＝1/2＋118i	Z_2＝1/2＋525i	Z'＝1/2＋321.5i
119	528	647	Z_1＝1/2＋119i	Z_2＝1/2＋528i	Z'＝1/2＋323.5i
120	533	653	Z_1＝1/2＋120i	Z_2＝1/2＋533i	Z'＝1/2＋326.5i
121	538	659	Z_1＝1/2＋121i	Z_2＝1/2＋538i	Z'＝1/2＋329.5i
122	539	661	Z_1＝1/2＋122i	Z_2＝1/2＋539i	Z'＝1/2＋330.5i
123	550	673	Z_1＝1/2＋123i	Z_2＝1/2＋550i	Z'＝1/2＋336.5i
124	553	677	Z_1＝1/2＋124i	Z_2＝1/2＋553i	Z'＝1/2＋338.5i
125	558	683	Z_1＝1/2＋125i	Z_2＝1/2＋558i	Z'＝1/2＋341.5i
126	565	691	Z_1＝1/2＋126i	Z_2＝1/2＋565i	Z'＝1/2＋345.5i
127	574	701	Z_1＝1/2＋127i	Z_2＝1/2＋574i	Z'＝1/2＋350.5i

128	581	709	Z_1＝1/2＋128i	Z_2＝1/2＋581i	Z'＝1/2＋354.5i
129	590	719	Z_1＝1/2＋129i	Z_2＝1/2＋590i	Z'＝1/2＋359.5i
130	597	727	Z_1＝1/2＋130i	Z_2＝1/2＋597i	Z'＝1/2＋363.5i
131	602	733	Z_1＝1/2＋131i	Z_2＝1/2＋602i	Z'＝1/2＋366.5i
132	607	739	Z_1＝1/2＋132i	Z_2＝1/2＋607i	Z'＝1/2＋369.5i
133	610	743	Z_1＝1/2＋133i	Z_2＝1/2＋610i	Z'＝1/2＋371.5i
134	617	751	Z_1＝1/2＋134i	Z_2＝1/2＋617i	Z'＝1/2＋375.5i
135	622	757	Z_1＝1/2＋135i	Z_2＝1/2＋622i	Z'＝1/2＋378.5i
136	625	761	Z_1＝1/2＋136i	Z_2＝1/2＋625i	Z'＝1/2＋380.5i
137	632	769	Z_1＝1/2＋137i	Z_2＝1/2＋632i	Z'＝1/2＋384.5i
138	635	773	Z_1＝1/2＋138i	Z_2＝1/2＋635i	Z'＝1/2＋386.5i
139	648	787	Z_1＝1/2＋139i	Z_2＝1/2＋648i	Z'＝1/2＋393.5i
140	657	797	Z_1＝1/2＋140i	Z_2＝1/2＋657i	Z'＝1/2＋398.5i
141	668	809	Z_1＝1/2＋141i	Z_2＝1/2＋668i	Z'＝1/2＋404.5i
142	669	811	Z_1＝1/2＋142i	Z_2＝1/2＋669i	Z'＝1/2＋405.5i
143	678	821	Z_1＝1/2＋143i	Z_2＝1/2＋678i	Z'＝1/2＋410.5i
144	679	823	Z_1＝1/2＋144i	Z_2＝1/2＋679i	Z'＝1/2＋411.5i
145	682	827	Z_1＝1/2＋145i	Z_2＝1/2＋682i	Z'＝1/2＋413.5i
146	683	829	Z_1＝1/2＋146i	Z_2＝1/2＋683i	Z'＝1/2＋414.5i
147	692	839	Z_1＝1/2＋147i	Z_2＝1/2＋692i	Z'＝1/2＋419.5i
148	705	853	Z_1＝1/2＋148i	Z_2＝1/2＋705i	Z'＝1/2＋426.5i
149	708	857	Z_1＝1/2＋149i	Z_2＝1/2＋708i	Z'＝1/2＋428.5i

150	709	859	$Z_1=1/2+150i$	$Z_2=1/2+709i$	$Z'=1/2+429.5i$
151	712	863	$Z_1=1/2+151i$	$Z_2=1/2+712i$	$Z'=1/2+431.5i$
152	725	877	$Z_1=1/2+152i$	$Z_2=1/2+725i$	$Z'=1/2+438.5i$
153	728	881	$Z_1=1/2+153i$	$Z_2=1/2+728i$	$Z'=1/2+440.5i$
154	729	883	$Z_1=1/2+154i$	$Z_2=1/2+729i$	$Z'=1/2+441.5i$
155	732	887	$Z_1=1/2+155i$	$Z_2=1/2+732i$	$Z'=1/2+443.5i$
156	751	907	$Z_1=1/2+156i$	$Z_2=1/2+751i$	$Z'=1/2+453.5i$
157	754	911	$Z_1=1/2+157i$	$Z_2=1/2+754i$	$Z'=\frac{1}{2}+455.5i$
158	761	919	$Z_1=1/2+158i$	$Z_2=1/2+761i$	$Z'=1/2+459.5i$
159	770	929	$Z_1=1/2+159i$	$Z_2=1/2+770i$	$Z'=1/2+464.5i$
160	777	937	$Z_1=1/2+160i$	$Z_2=1/2+777i$	$Z'=1/2+468.5i$
161	780	941	$Z_1=1/2+161i$	$Z_2=1/2+780i$	$Z'=1/2+470.5i$
162	785	947	$Z_1=1/2+162i$	$Z_2=1/2+785i$	$Z'=1/2+473.5i$
163	790	953	$Z_1=1/2+163i$	$Z_2=1/2+790i$	$Z'=1/2+476.5i$
164	803	967	$Z_1=1/2+164i$	$Z_2=1/2+803i$	$Z'=1/2+483.5i$
165	806	971	$Z_1=1/2+165i$	$Z_2=1/2+806i$	$Z'=1/2+485.5i$
166	811	977	$Z_1=1/2+166i$	$Z_2=1/2+811i$	$Z'=1/2+488.5i$
167	816	983	$Z_1=1/2+167i$	$Z_2=1/2+816i$	$Z'=1/2+491.5i$
168	823	991	$Z_1=1/2+168i$	$Z_2=1/2+823i$	$Z'=1/2+495.5i$
169	828	997	$Z_1=1/2+169i$	$Z_2=1/2+828i$	$Z'=1/2+498.5i$
170	839	1009	$Z_1=1/2+170i$	$Z_2=1/2+839i$	$Z'=1/2+504.5i$
171	842	1013	$Z_1=1/2+171i$	$Z_2=1/2+842i$	$Z'=1/2+506.5i$

172	847	1019	$Z_1=1/2+172i$	$Z_2=1/2+847i$	$Z'=1/2+509.5i$
173	848	1021	$Z_1=1/2+173i$	$Z_2=1/2+848i$	$Z'=1/2+510.5i$
174	857	1031	$Z_1=1/2+174i$	$Z_2=1/2+857i$	$Z'=1/2+515.5i$
175	858	1033	$Z_1=1/2+175i$	$Z_2=1/2+858i$	$Z'=1/2+516.5i$
176	863	1039	$Z_1=1/2+176i$	$Z_2=1/2+863i$	$Z'=1/2+519.5i$
177	872	1049	$Z_1=1/2+177i$	$Z_2=1/2+872i$	$Z'=1/2+524.5i$
178	873	1051	$Z_1=1/2+178i$	$Z_2=1/2+873i$	$Z'=1/2+525.5i$
179	882	1061	$Z_1=1/2+179i$	$Z_2=1/2+882i$	$Z'=1/2+530.5i$
180	883	1063	$Z_1=1/2+180i$	$Z_2=1/2+883i$	$Z'=1/2+531.5i$
181	888	1069	$Z_1=1/2+181i$	$Z_2=1/2+888i$	$Z'=1/2+534.5i$
182	905	1087	$Z_1=1/2+182i$	$Z_2=1/2+905i$	$Z'=1/2+543.5i$
183	908	1091	$Z_1=1/2+183i$	$Z_2=1/2+908i$	$Z'=1/2+545.5i$
184	909	1093	$Z_1=1/2+184i$	$Z_2=1/2+909i$	$Z'=1/2+546.5i$
185	912	1097	$Z_1=1/2+185i$	$Z_2=1/2+912i$	$Z'=1/2+548.5i$
186	917	1103	$Z_1=1/2+186i$	$Z_2=1/2+917i$	$Z'=1/2+551.5i$
187	922	1109	$Z_1=1/2+187i$	$Z_2=1/2+922i$	$Z'=1/2+554.5i$
188	929	1117	$Z_1=1/2+188i$	$Z_2=1/2+929i$	$Z'=1/2+558.5i$
189	934	1123	$Z_1=1/2+189i$	$Z_2=1/2+934i$	$Z'=1/2+561.5i$
190	939	1129	$Z_1=1/2+190i$	$Z_2=1/2+939i$	$Z'=1/2+564.5i$
191	960	1151	$Z_1=1/2+191i$	$Z_2=1/2+960i$	$Z'=1/2+575.5i$
192	961	1153	$Z_1=1/2+192i$	$Z_2=1/2+961i$	$Z'=1/2+576.5i$
193	970	1163	$Z_1=1/2+193i$	$Z_2=1/2+970i$	$Z'=1/2+581.5i$

194	977	1171	Z_1＝1/2＋194i	Z_2＝1/2＋977i	Z'＝1/2＋585.5i
195	986	1181	Z_1＝1/2＋195i	Z_2＝1/2＋986i	Z'＝1/2＋590.5i
196	991	1187	Z_1＝1/2＋196i	Z_2＝1/2＋991i	Z'＝1/2＋593.5i
197	996	1193	Z_1＝1/2＋197i	Z_2＝1/2＋996i	Z'＝1/2＋596.5i
198	1003	1201	Z_1＝1/2＋198i	Z_2＝1/2＋1003i	Z'＝1/2＋600.5i
199	1014	1213	Z_1＝1/2＋199i	Z_2＝1/2＋1014i	Z'＝1/2＋606.5i
200	1017	1217	Z_1＝1/2＋200i	Z_2＝1/2＋1017i	Z'＝1/2＋608.5i
201	1022	1223	Z_1＝1/2＋201i	Z_2＝1/2＋1022i	Z'＝1/2＋611.5i
202	1027	1229	Z_1＝1/2＋202i	Z_2＝1/2＋1027i	Z'＝1/2＋614.5i
203	1028	1231	Z_1＝1/2＋203i	Z_2＝1/2＋1028i	Z'＝1/2＋615.5i
204	1033	1237	Z_1＝1/2＋204i	Z_2＝1/2＋1033i	Z'＝1/2＋618.5i
205	1044	1249	Z_1＝1/2＋205i	Z_2＝1/2＋1044i	Z'＝1/2＋624.5i
206	1053	1259	Z_1＝1/2＋206i	Z_2＝1/2＋1053i	Z'＝1/2＋629.5i
207	1070	1277	Z_1＝1/2＋207i	Z_2＝1/2＋1070i	Z'＝1/2＋638.5i
208	1071	1279	Z_1＝1/2＋208i	Z_2＝1/2＋1071i	Z'＝1/2＋639.5i
209	1074	1283	Z_1＝1/2＋209i	Z_2＝1/2＋1074i	Z'＝1/2＋641.5i
210	1079	1289	Z_1＝1/2＋210i	Z_2＝1/2＋1079i	Z'＝1/2＋644.5i
211	1080	1291	Z_1＝1/2＋211i	Z_2＝1/2＋1080i	Z'＝1/2＋645.5i
212	1085	1297	Z_1＝1/2＋212i	Z_2＝1/2＋1085i	Z'＝1/2＋648.5i
213	1088	1301	Z_1＝1/2＋213i	Z_2＝1/2＋1088i	Z'＝1/2＋650.5i
214	1089	1303	Z_1＝1/2＋214i	Z_2＝1/2＋1089i	Z'＝1/2＋651.5i
215	1092	1307	Z_1＝1/2＋215i	Z_2＝1/2＋1092i	Z'＝1/2＋653.5i

216	1103	1319	$Z_1=1/2+216i$	$Z_2=1/2+1103i$	$Z'=1/2+659.5i$
217	1104	1321	$Z_1=1/2+217i$	$Z_2=1/2+1104i$	$Z'=1/2+660.5i$
218	1109	1327	$Z_1=1/2+218i$	$Z_2=1/2+1109i$	$Z'=1/2+663.5i$
219	1142	1361	$Z_1=1/2+219i$	$Z_2=1/2+1142i$	$Z'=1/2+680.5i$
220	1147	1367	$Z_1=1/2+220i$	$Z_2=1/2+1147i$	$Z'=1/2+683.5i$
221	1152	1373	$Z_1=1/2+221i$	$Z_2=1/2+1152i$	$Z'=1/2+686.5i$
222	1159	1381	$Z_1=1/2+222i$	$Z_2=1/2+1159i$	$Z'=1/2+690.5i$
223	1176	1399	$Z_1=1/2+223i$	$Z_2=1/2+1176i$	$Z'=1/2+699.5i$
224	1185	1409	$Z_1=1/2+224i$	$Z_2=1/2+1185i$	$Z'=1/2+704.5i$
225	1198	1423	$Z_1=1/2+225i$	$Z_2=1/2+1198i$	$Z'=1/2+711.5i$
226	1201	1427	$Z_1=1/2+226i$	$Z_2=1/2+1201i$	$Z'=1/2+713.5i$
227	1202	1429	$Z_1=1/2+227i$	$Z_2=1/2+1202i$	$Z'=1/2+714.5i$
228	1205	1433	$Z_1=1/2+228i$	$Z_2=1/2+1205i$	$Z'=1/2+716.5i$
229	1210	1439	$Z_1=1/2+229i$	$Z_2=1/2+1210i$	$Z'=1/2+719.5i$
230	1217	1447	$Z_1=1/2+230i$	$Z_2=1/2+1217i$	$Z'=1/2+723.5i$
231	1220	1451	$Z_1=1/2+231i$	$Z_2=1/2+1220i$	$Z'=1/2+725.5i$
232	1221	1453	$Z_1=1/2+232i$	$Z_2=1/2+1221i$	$Z'=1/2+726.5i$
233	1226	1459	$Z_1=1/2+233i$	$Z_2=1/2+1226i$	$Z'=1/2+729.5i$
234	1237	1471	$Z_1=1/2+234i$	$Z_2=1/2+1237i$	$Z'=\frac{1}{2}+735.5i$
235	1246	1481	$Z_1=1/2+235i$	$Z_2=1/2+1246i$	$Z'=1/2+740.5i$
236	1247	1483	$Z_1=1/2+236i$	$Z_2=1/2+1247i$	$Z'=1/2+741.5i$
237	1250	1487	$Z_1=1/2+237i$	$Z_2=1/2+1250i$	$Z'=1/2+743.5i$

238	1251	1489	$Z_1=1/2+238i$	$Z_2=1/2+1251i$	$Z'=1/2+744.5i$
239	1254	1493	$Z_1=1/2+239i$	$Z_2=1/2+1254i$	$Z'=1/2+746.5i$
240	1259	1499	$Z_1=1/2+240i$	$Z_2=1/2+1259i$	$Z'=1/2+749.5i$
241	1270	1511	$Z_1=1/2+241i$	$Z_2=1/2+1270i$	$Z'=1/2+755.5i$
242	1281	1523	$Z_1=1/2+242i$	$Z_2=1/2+1281i$	$Z'=1/2+761.5i$
243	1288	1531	$Z_1=1/2+243i$	$Z_2=1/2+1288i$	$Z'=1/2+765.5i$
244	1299	1543	$Z_1=1/2+244i$	$Z_2=1/2+1299i$	$Z'=1/2+771.5i$
245	1304	1549	$Z_1=1/2+245i$	$Z_2=1/2+1304i$	$Z'=1/2+774.5i$
246	1307	1553	$Z_1=1/2+246i$	$Z_2=1/2+1307i$	$Z'=1/2+776.5i$
247	1312	1559	$Z_1=1/2+247i$	$Z_2=1/2+1312i$	$Z'=1/2+779.5i$
248	1319	1567	$Z_1=1/2+248i$	$Z_2=1/2+1319i$	$Z'=1/2+783.5i$
249	1322	1571	$Z_1=1/2+249i$	$Z_2=1/2+1322i$	$Z'=1/2+785.5i$
250	1329	1579	$Z_1=1/2+250i$	$Z_2=1/2+1329i$	$Z'=1/2+789.5i$
251	1332	1583	$Z_1=1/2+251i$	$Z_2=1/2+1332i$	$Z'=1/2+791.5i$
252	1345	1597	$Z_1=1/2+252i$	$Z_2=1/2+1345i$	$Z'=1/2+798.5i$
253	1348	1601	$Z_1=1/2+253i$	$Z_2=1/2+1348i$	$Z'=1/2+800.5i$
254	1353	1607	$Z_1=1/2+254i$	$Z_2=1/2+1353i$	$Z'=1/2+803.5i$
255	1354	1609	$Z_1=1/2+255i$	$Z_2=1/2+1354i$	$Z'=1/2+804.5i$
256	1357	1613	$Z_1=1/2+256i$	$Z_2=1/2+1357i$	$Z'=1/2+806.5i$
257	1362	1619	$Z_1=1/2+257i$	$Z_2=1/2+1362i$	$Z'=1/2+809.5i$
258	1363	1621	$Z_1=1/2+258i$	$Z_2=1/2+1363i$	$Z'=1/2+810.5i$
259	1368	1627	$Z_1=1/2+259i$	$Z_2=1/2+1368i$	$Z'=1/2+813.5i$

260	1377	1637	$Z_1 = 1/2 + 260i$	$Z_2 = 1/2 + 1377i$	$Z' = 1/2 + 818.5i$
261	1396	1657	$Z_1 = 1/2 + 261i$	$Z_2 = 1/2 + 1396i$	$Z' = 1/2 + 828.5i$
262	1401	1663	$Z_1 = 1/2 + 262i$	$Z_2 = 1/2 + 1401i$	$Z' = 1/2 + 831.5i$
263	1404	1667	$Z_1 = 1/2 + 263i$	$Z_2 = 1/2 + 1404i$	$Z' = 1/2 + 833.5i$
264	1405	1669	$Z_1 = 1/2 + 264i$	$Z_2 = 1/2 + 1405i$	$Z' = 1/2 + 834.5i$
265	1428	1693	$Z_1 = 1/2 + 265i$	$Z_2 = 1/2 + 1428i$	$Z' = 1/2 + 846.5i$
266	1431	1697	$Z_1 = 1/2 + 266i$	$Z_2 = 1/2 + 1431i$	$Z' = 1/2 + 848.5i$
267	1432	1699	$Z_1 = 1/2 + 267i$	$Z_2 = 1/2 + 1432i$	$Z' = 1/2 + 849.5i$
268	1441	1709	$Z_1 = 1/2 + 268i$	$Z_2 = 1/2 + 1441i$	$Z' = 1/2 + 854.5i$
269	1452	1721	$Z_1 = 1/2 + 269i$	$Z_2 = 1/2 + 1452i$	$Z' = 1/2 + 860.5i$
270	1453	1723	$Z_1 = 1/2 + 270i$	$Z_2 = 1/2 + 1453i$	$Z' = 1/2 + 861.5i$
271	1462	1733	$Z_1 = 1/2 + 271i$	$Z_2 = 1/2 + 1462i$	$Z' = 1/2 + 866.5i$
272	1469	1741	$Z_1 = 1/2 + 272i$	$Z_2 = 1/2 + 1469i$	$Z' = 1/2 + 870.5i$
273	1474	1747	$Z_1 = 1/2 + 273i$	$Z_2 = 1/2 + 1474i$	$Z' = 1/2 + 873.5i$
274	1479	1753	$Z_1 = 1/2 + 274i$	$Z_2 = 1/2 + 1479i$	$Z' = 1/2 + 876.5i$
275	1484	1759	$Z_1 = 1/2 + 275i$	$Z_2 = 1/2 + 1484i$	$Z' = 1/2 + 879.5i$
276	1501	1777	$Z_1 = 1/2 + 276i$	$Z_2 = 1/2 + 1501i$	$Z' = 1/2 + 888.5i$
277	1506	1783	$Z_1 = 1/2 + 277i$	$Z_2 = 1/2 + 1506i$	$Z' = 1/2 + 891.5i$
278	1509	1787	$Z_1 = 1/2 + 278i$	$Z_2 = 1/2 + 1509i$	$Z' = 1/2 + 893.5i$
279	1510	1789	$Z_1 = 1/2 + 279i$	$Z_2 = 1/2 + 1510i$	$Z' = 1/2 + 894.5i$
280	1521	1801	$Z_1 = 1/2 + 280i$	$Z_2 = 1/2 + 1521i$	$Z' = 1/2 + 900.5i$
281	1530	1811	$Z_1 = 1/2 + 281i$	$Z_2 = 1/2 + 1530i$	$Z' = 1/2 + 905.5i$

282	1541	1823	$Z_1=1/2+282i$	$Z_2=1/2+1541i$	$Z'=1/2+911.5i$
283	1548	1831	$Z_1=1/2+283i$	$Z_2=1/2+1548i$	$Z'=1/2+915.5i$
284	1563	1847	$Z_1=1/2+284i$	$Z_2=1/2+1563i$	$Z'=1/2+923.5i$
285	1576	1861	$Z_1=1/2+285i$	$Z_2=1/2+1576i$	$Z'=1/2+930.5i$
286	1581	1867	$Z_1=1/2+286i$	$Z_2=1/2+1581i$	$Z'=1/2+933.5i$
287	1584	1871	$Z_1=1/2+287i$	$Z_2=1/2+1584i$	$Z'=1/2+935.5i$
288	1585	1873	$Z_1=1/2+288i$	$Z_2=1/2+1585i$	$Z'=1/2+936.5i$
289	1588	1877	$Z_1=1/2+289i$	$Z_2=1/2+1588i$	$Z'=1/2+938.5i$
290	1589	1879	$Z_1=1/2+290i$	$Z_2=1/2+1589i$	$Z'=1/2+939.5i$
291	1598	1889	$Z_1=1/2+291i$	$Z_2=1/2+1598i$	$Z'=1/2+944.5i$
292	1609	1901	$Z_1=1/2+292i$	$Z_2=1/2+1609i$	$Z'=1/2+950.5i$
293	1614	1907	$Z_1=1/2+293i$	$Z_2=1/2+1614i$	$Z'=1/2+953.5i$
294	1619	1913	$Z_1=1/2+294i$	$Z_2=1/2+1619i$	$Z'=1/2+956.5i$
295	1636	1931	$Z_1=1/2+295i$	$Z_2=1/2+1636i$	$Z'=1/2+965.5i$
296	1637	1933	$Z_1=1/2+296i$	$Z_2=1/2+1637i$	$Z'=1/2+966.5i$
297	1652	1949	$Z_1=1/2+297i$	$Z_2=1/2+1652i$	$Z'=1/2+974.5i$
298	1653	1951	$Z_1=1/2+298i$	$Z_2=1/2+1653i$	$Z'=1/2+975.5i$
299	1674	1973	$Z_1=1/2+299i$	$Z_2=1/2+1674i$	$Z'=1/2+986.5i$
300	1679	1979	$Z_1=1/2+300i$	$Z_2=1/2+1679i$	$Z'=1/2+989.5i$
301	1686	1987	$Z_1=1/2+301i$	$Z_2=1/2+1686i$	$Z'=1/2+993.5i$
302	1691	1993	$Z_1=1/2+302i$	$Z_2=1/2+1691i$	$Z'=1/2+996.5i$
303	1694	1997	$Z_1=1/2+303i$	$Z_2=1/2+1694i$	$Z'=1/2+998.5i$

304	1695	1999	$Z_1=1/2+304i$	$Z_2=1/2+1695i$	$Z'=1/2+999.5i$
305	1698	2003	$Z_1=1/2+305i$	$Z_2=1/2+1698i$	$Z'=1/2+1001.5i$
306	1705	2011	$Z_1=1/2+306i$	$Z_2=1/2+1705i$	$Z'=1/2+1005.5i$
307	1710	2017	$Z_1=1/2+307i$	$Z_2=1/2+1710i$	$Z'=1/2+1008.5i$
308	1719	2027	$Z_1=1/2+308i$	$Z_2=1/2+1719i$	$Z'=1/2+1013.5i$
309	1720	2029	$Z_1=1/2+309i$	$Z_2=1/2+1720i$	$Z'=1/2+1014.5i$
310	1729	2039	$Z_1=1/2+310i$	$Z_2=1/2+1729i$	$Z'=1/2+1019.5i$
311	1742	2053	$Z_1=1/2+311i$	$Z_2=1/2+1742i$	$Z'=1/2+1026.5i$
312	1751	2063	$Z_1=1/2+312i$	$Z_2=1/2+1751i$	$Z'=1/2+1031.5i$
313	1756	2069	$Z_1=1/2+313i$	$Z_2=1/2+1756i$	$Z'=1/2+1034.5i$
314	1767	2081	$Z_1=1/2+314i$	$Z_2=1/2+1767i$	$Z'=1/2+1040.5i$
315	1768	2083	$Z_1=1/2+315i$	$Z_2=1/2+1768i$	$Z'=1/2+1041.5i$
316	1771	2087	$Z_1=1/2+316i$	$Z_2=1/2+1771i$	$Z'=1/2+1043.5i$
317	1772	2089	$Z_1=1/2+317i$	$Z_2=1/2+1772i$	$Z'=1/2+1044.5i$
318	1781	2099	$Z_1=1/2+318i$	$Z_2=1/2+1781i$	$Z'=1/2+1049.5i$
319	1792	2111	$Z_1=1/2+319i$	$Z_2=1/2+1792i$	$Z'=1/2+1055.5i$
320	1793	2113	$Z_1=1/2+320i$	$Z_2=1/2+1793i$	$Z'=1/2+1056.5i$
321	1808	2129	$Z_1=1/2+321i$	$Z_2=1/2+1808i$	$Z'=1/2+1064.5i$
322	1809	2131	$Z_1=1/2+322i$	$Z_2=1/2+1809i$	$Z'=1/2+1065.5i$
323	1814	2137	$Z_1=1/2+323i$	$Z_2=1/2+1814i$	$Z'=1/2+1068.5i$
324	1817	2141	$Z_1=1/2+324i$	$Z_2=1/2+1817i$	$Z'=1/2+1070.5i$
325	1818	2143	$Z_1=1/2+325i$	$Z_2=1/2+1818i$	$Z'=1/2+1071.5i$

326	1827	2153	$Z_1=1/2+326i$	$Z_2=1/2+1827i$	$Z'=1/2+1076.5i$
327	1834	2161	$Z_1=1/2+327i$	$Z_2=1/2+1834i$	$Z'=1/2+1080.5i$
328	1851	2179	$Z_1=1/2+328i$	$Z_2=1/2+1851i$	$Z'=1/2+1089.5i$
329	1874	2203	$Z_1=1/2+329i$	$Z_2=1/2+1874i$	$Z'=1/2+1101.5i$
330	1877	2207	$Z_1=1/2+330i$	$Z_2=1/2+1877i$	$Z'=1/2+1103.5i$
331	1882	2213	$Z_1=1/2+331i$	$Z_2=1/2+1882i$	$Z'=1/2+1106.5i$
332	1889	2221	$Z_1=1/2+332i$	$Z_2=1/2+1889i$	$Z'=1/2+1110.5i$
333	1904	2237	$Z_1=1/2+333i$	$Z_2=1/2+1904i$	$Z'=1/2+1118.5i$
334	1905	2239	$Z_1=1/2+334i$	$Z_2=1/2+1905i$	$Z'=1/2+1119.5i$
335	1908	2243	$Z_1=1/2+335i$	$Z_2=1/2+1908i$	$Z'=1/2+1121.5i$
336	1915	2251	$Z_1=1/2+336i$	$Z_2=1/2+1915i$	$Z'=1/2+1125.5i$
337	1930	2267	$Z_1=1/2+337i$	$Z_2=1/2+1930i$	$Z'=1/2+1133.5i$
338	1931	2269	$Z_1=1/2+338i$	$Z_2=1/2+1931i$	$Z'=1/2+1134.5i$
339	1934	2273	$Z_1=1/2+339i$	$Z_2=1/2+1934i$	$Z'=1/2+1136.5i$
340	1941	2281	$Z_1=1/2+340i$	$Z_2=1/2+1941i$	$Z'=1/2+1140.5i$
341	1946	2287	$Z_1=1/2+341i$	$Z_2=1/2+1946i$	$Z'=1/2+1143.5i$
342	1951	2293	$Z_1=1/2+342i$	$Z_2=1/2+1951i$	$Z'=1/2+1146.5i$
343	1954	2297	$Z_1=1/2+343i$	$Z_2=1/2+1954i$	$Z'=1/2+1148.5i$
344	1965	2309	$Z_1=1/2+344i$	$Z_2=1/2+1965i$	$Z'=1/2+1154.5i$
345	1966	2311	$Z_1=1/2+345i$	$Z_2=1/2+1966i$	$Z'=1/2+1155.5i$
346	1987	2333	$Z_1=1/2+346i$	$Z_2=1/2+1987i$	$Z'=1/2+1166.5i$
347	1992	2339	$Z_1=1/2+347i$	$Z_2=1/2+1992i$	$Z'=1/2+1169.5i$

348	1993	2341	$Z_1=1/2+348i$	$Z_2=1/2+1993i$	$Z'=1/2+1170.5i$
349	1998	2347	$Z_1=1/2+349i$	$Z_2=1/2+1998i$	$Z'=1/2+1173.5i$
350	2001	2351	$Z_1=1/2+350i$	$Z_2=1/2+2001i$	$Z'=1/2+1175.5i$
351	2006	2357	$Z_1=1/2+351i$	$Z_2=1/2+2006i$	$Z'=1/2+1178.5i$
352	2019	2371	$Z_1=1/2+352i$	$Z_2=1/2+2019i$	$Z'=1/2+1185.5i$
353	2024	2377	$Z_1=1/2+353i$	$Z_2=1/2+2024i$	$Z'=1/2+1188.5i$
354	2027	2381	$Z_1=1/2+354i$	$Z_2=1/2+2027i$	$Z'=1/2+1190.5i$
355	2028	2383	$Z_1=1/2+355i$	$Z_2=1/2+2028i$	$Z'=1/2+1191.5i$
356	2033	2389	$Z_1=1/2+356i$	$Z_2=1/2+2033i$	$Z'=1/2+1194.5i$
357	2036	2393	$Z_1=1/2+357i$	$Z_2=1/2+2036i$	$Z'=1/2+1196.5i$
358	2041	2399	$Z_1=1/2+358i$	$Z_2=1/2+2041i$	$Z'=1/2+1199.5i$
359	2052	2411	$Z_1=1/2+359i$	$Z_2=1/2+2052i$	$Z'=1/2+1205.5i$
360	2057	2417	$Z_1=1/2+360i$	$Z_2=1/2+2057i$	$Z'=1/2+1208.5i$
361	2062	2423	$Z_1=1/2+361i$	$Z_2=1/2+2062i$	$Z'=1/2+1211.5i$
362	2075	2437	$Z_1=1/2+362i$	$Z_2=1/2+2075i$	$Z'=1/2+1218.5i$
363	2078	2441	$Z_1=1/2+363i$	$Z_2=1/2+2078i$	$Z'=1/2+1220.5i$
364	2083	2447	$Z_1=1/2+364i$	$Z_2=1/2+2083i$	$Z'=1/2+1223.5i$
365	2094	2459	$Z_1=1/2+365i$	$Z_2=1/2+2094i$	$Z'=1/2+1229.5i$
366	2101	2467	$Z_1=1/2+366i$	$Z_2=1/2+2101i$	$Z'=1/2+1233.5i$
367	2106	2473	$Z_1=1/2+367i$	$Z_2=1/2+2106i$	$Z'=1/2+1236.5i$
368	2109	2477	$Z_1=1/2+368i$	$Z_2=1/2+2109i$	$Z'=1/2+1238.5i$
369	2134	2503	$Z_1=1/2+369i$	$Z_2=1/2+2134i$	$Z'=1/2+1251.5i$

370	2151	2521	$Z_1=1/2+370i$	$Z_2=1/2+2151i$	$Z'=1/2+1210.5i$
371	2160	2531	$Z_1=1/2+371i$	$Z_2=1/2+2160i$	$Z'=1/2+1265.5i$
372	2167	2539	$Z_1=1/2+372i$	$Z_2=1/2+2167i$	$Z'=1/2+1269.5i$
373	2170	2543	$Z_1=1/2+373i$	$Z_2=1/2+2170i$	$Z'=1/2+1271.5i$
374	2175	2549	$Z_1=1/2+374i$	$Z_2=1/2+2175i$	$Z'=1/2+1274.5i$
375	2176	2551	$Z_1=1/2+375i$	$Z_2=1/2+2176i$	$Z'=1/2+1275.5i$
376	2181	2557	$Z_1=1/2+376i$	$Z_2=1/2+2181i$	$Z'=1/2+1278.5i$
377	2202	2579	$Z_1=1/2+377i$	$Z_2=1/2+2202i$	$Z'=1/2+1289.5i$
378	2213	2591	$Z_1=1/2+378i$	$Z_2=1/2+2213i$	$Z'=1/2+1295.5i$
379	2214	2593	$Z_1=1/2+379i$	$Z_2=1/2+2214i$	$Z'=1/2+1296.5i$
380	2229	2609	$Z_1=1/2+380i$	$Z_2=1/2+2229i$	$Z'=1/2+1304.5i$
381	2236	2617	$Z_1=1/2+381i$	$Z_2=1/2+2236i$	$Z'=1/2+1308.5i$
382	2239	2621	$Z_1=1/2+382i$	$Z_2=1/2+2239i$	$Z'=1/2+1310.5i$
383	2250	2633	$Z_1=1/2+383i$	$Z_2=1/2+2250i$	$Z'=1/2+1316.5i$
384	2263	2647	$Z_1=1/2+384i$	$Z_2=1/2+2263i$	$Z'=1/2+1323.5i$
385	2272	2657	$Z_1=1/2+385i$	$Z_2=1/2+2272i$	$Z'=1/2+1328.5i$
386	2273	2659	$Z_1=1/2+386i$	$Z_2=1/2+2273i$	$Z'=1/2+1329.5i$
387	2276	2663	$Z_1=1/2+387i$	$Z_2=1/2+2276i$	$Z'=1/2+1331.5i$
388	2283	2671	$Z_1=1/2+388i$	$Z_2=1/2+2283i$	$Z'=1/2+1335.5i$
389	2288	2677	$Z_1=1/2+389i$	$Z_2=1/2+2288i$	$Z'=1/2+1338.5i$
390	2293	2683	$Z_1=1/2+390i$	$Z_2=1/2+2293i$	$Z'=1/2+1341.5i$
391	2296	2687	$Z_1=1/2+391i$	$Z_2=1/2+2296i$	$Z'=1/2+1343.5i$

392	2297	2689	$Z_1=1/2+392i$	$Z_2=1/2+2297i$	$Z'=1/2+1344.5i$
393	2300	2693	$Z_1=1/2+393i$	$Z_2=1/2+2300i$	$Z'=1/2+1346.5i$
394	2305	2699	$Z_1=1/2+394i$	$Z_2=1/2+2305i$	$Z'=1/2+1349.5i$
395	2312	2707	$Z_1=1/2+395i$	$Z_2=1/2+2312i$	$Z'=1/2+1353.5i$
396	2315	2711	$Z_1=1/2+396i$	$Z_2=1/2+2315i$	$Z'=1/2+1355.5i$
397	2316	2713	$Z_1=1/2+397i$	$Z_2=1/2+2316i$	$Z'=1/2+1356.5i$
398	2321	2719	$Z_1=1/2+398i$	$Z_2=1/2+2321i$	$Z'=1/2+1359.5i$
399	2330	2729	$Z_1=1/2+399i$	$Z_2=1/2+2330i$	$Z'=1/2+1364.5i$
400	2331	2731	$Z_1=1/2+400i$	$Z_2=1/2+2331i$	$Z'=1/2+1365.5i$
401	2340	2741	$Z_1=1/2+401i$	$Z_2=1/2+2340i$	$Z'=1/2+1370.5i$
402	2347	2749	$Z_1=1/2+402i$	$Z_2=1/2+2347i$	$Z'=1/2+1374.5i$
403	2350	2753	$Z_1=1/2+403i$	$Z_2=1/2+2350i$	$Z'=1/2+1376.5i$
404	2363	2767	$Z_1=1/2+404i$	$Z_2=1/2+2363i$	$Z'=1/2+1383.5i$
405	2372	2777	$Z_1=1/2+405i$	$Z_2=1/2+2372i$	$Z'=1/2+1388.5i$
406	2383	2789	$Z_1=1/2+406i$	$Z_2=1/2+2383i$	$Z'=1/2+1394.5i$
407	2384	2791	$Z_1=1/2+407i$	$Z_2=1/2+2384i$	$Z'=1/2+1395.5i$
408	2389	2797	$Z_1=1/2+408i$	$Z_2=1/2+2389i$	$Z'=1/2+1398.5i$
409	2392	2801	$Z_1=1/2+409i$	$Z_2=1/2+2392i$	$Z'=1/2+1400.5i$
410	2393	2803	$Z_1=1/2+410i$	$Z_2=1/2+2393i$	$Z'=1/2+1401.5i$
411	2408	2819	$Z_1=1/2+411i$	$Z_2=1/2+2408i$	$Z'=1/2+1409.5i$
412	2421	2833	$Z_1=1/2+412i$	$Z_2=1/2+2421i$	$Z'=1/2+1416.5i$
413	2424	2837	$Z_1=1/2+413i$	$Z_2=1/2+2424i$	$Z'=1/2+1418.5i$

414	2429	2843	$Z_1=1/2+414i$	$Z_2=1/2+2429i$	$Z'=1/2+1421.5i$
415	2436	2851	$Z_1=1/2+415i$	$Z_2=1/2+2436i$	$Z'=1/2+1425.5i$
416	2441	2857	$Z_1=1/2+416i$	$Z_2=1/2+2441i$	$Z'=1/2+1428.5i$
417	2444	2861	$Z_1=1/2+417i$	$Z_2=1/2+2444i$	$Z'=1/2+1430.5i$
418	2461	2879	$Z_1=1/2+418i$	$Z_2=1/2+2461i$	$Z'=1/2+1439.5i$
419	2468	2887	$Z_1=1/2+419i$	$Z_2=1/2+2468i$	$Z'=1/2+1443.5i$
420	2477	2897	$Z_1=1/2+420i$	$Z_2=1/2+2477i$	$Z'=1/2+1448.5i$
421	2482	2903	$Z_1=1/2+421i$	$Z_2=1/2+2482i$	$Z'=1/2+1451.5i$
422	2487	2909	$Z_1=1/2+422i$	$Z_2=1/2+2487i$	$Z'=1/2+1454.5i$
423	2494	2917	$Z_1=1/2+423i$	$Z_2=1/2+2494i$	$Z'=1/2+1458.5i$
424	2503	2927	$Z_1=1/2+424i$	$Z_2=1/2+2503i$	$Z'=1/2+1463.5i$
425	2514	2939	$Z_1=1/2+425i$	$Z_2=1/2+2514i$	$Z'=1/2+1469.5i$
426	2527	2953	$Z_1=1/2+426i$	$Z_2=1/2+2527i$	$Z'=1/2+1476.5i$
427	2530	2957	$Z_1=1/2+427i$	$Z_2=1/2+2530i$	$Z'=1/2+1478.5i$
428	2535	2963	$Z_1=1/2+428i$	$Z_2=1/2+2535i$	$Z'=1/2+1481.5i$
429	2540	2969	$Z_1=1/2+429i$	$Z_2=1/2+2540i$	$Z'=1/2+1484.5i$
430	2541	2971	$Z_1=1/2+430i$	$Z_2=1/2+2541i$	$Z'=1/2+1485.5i$
431	2568	2999	$Z_1=1/2+431i$	$Z_2=1/2+2568i$	$Z'=1/2+1499.5i$
432	2569	3001	$Z_1=1/2+432i$	$Z_2=1/2+2569i$	$Z'=1/2+1500.5i$
433	2578	3011	$Z_1=1/2+433i$	$Z_2=1/2+2578i$	$Z'=1/2+1505.5i$
434	2585	3019	$Z_1=1/2+434i$	$Z_2=1/2+2585i$	$Z'=1/2+1509.5i$
435	2588	3023	$Z_1=1/2+435i$	$Z_2=1/2+2588i$	$Z'=1/2+1511.5i$

436	2601	3037	$Z_1=1/2+436i$	$Z_2=1/2+2601i$	$Z'=1/2+1518.5i$
437	2604	3041	$Z_1=1/2+437i$	$Z_2=1/2+2604i$	$Z'=1/2+1520.5i$
438	2611	3049	$Z_1=1/2+438i$	$Z_2=1/2+2611i$	$Z'=1/2+1524.5i$
439	2622	3061	$Z_1=1/2+439i$	$Z_2=1/2+2622i$	$Z'=1/2+1530.5i$
440	2627	3067	$Z_1=1/2+440i$	$Z_2=1/2+2627i$	$Z'=1/2+1533.5i$
441	2638	3079	$Z_1=1/2+441i$	$Z_2=1/2+2638i$	$Z'=1/2+1539.5i$
442	2641	3083	$Z_1=1/2+442i$	$Z_2=1/2+2641i$	$Z'=1/2+1541.5i$
443	2646	3089	$Z_1=1/2+443i$	$Z_2=1/2+2646i$	$Z'=1/2+1544.5i$
444	2665	3109	$Z_1=1/2+444i$	$Z_2=1/2+2665i$	$Z'=1/2+1554.5i$
445	2674	3119	$Z_1=1/2+445i$	$Z_2=1/2+2674i$	$Z'=1/2+1559.5i$
446	2675	3121	$Z_1=1/2+446i$	$Z_2=1/2+2675i$	$Z'=1/2+1560.5i$
447	2690	3137	$Z_1=1/2+447i$	$Z_2=1/2+2690i$	$Z'=1/2+1568.5i$
448	2715	3163	$Z_1=1/2+448i$	$Z_2=1/2+2715i$	$Z'=1/2+1581.5i$
449	2718	3167	$Z_1=1/2+449i$	$Z_2=1/2+2718i$	$Z'=1/2+1583.5i$
450	2719	3169	$Z_1=1/2+450i$	$Z_2=1/2+2719i$	$Z'=1/2+1584.5i$
451	2730	3181	$Z_1=1/2+451i$	$Z_2=1/2+2730i$	$Z'=1/2+1590.5i$
452	2735	3187	$Z_1=1/2+452i$	$Z_2=1/2+2735i$	$Z'=1/2+1593.5i$
453	2738	3191	$Z_1=1/2+453i$	$Z_2=1/2+2738i$	$Z'=1/2+1595.5i$
454	2749	3203	$Z_1=1/2+454i$	$Z_2=1/2+2749i$	$Z'=1/2+1601.5i$
455	2754	3209	$Z_1=1/2+455i$	$Z_2=1/2+2754i$	$Z'=1/2+1604.5i$
456	2761	3217	$Z_1=1/2+456i$	$Z_2=1/2+2761i$	$Z'=1/2+1608.5i$
457	2764	3221	$Z_1=1/2+457i$	$Z_2=1/2+2764i$	$Z'=1/2+1610.5i$

458	2771	3229	$Z_1=1/2+458i$	$Z_2=1/2+2771i$	$Z'=1/2+1614.5i$
459	2792	3251	$Z_1=1/2+459i$	$Z_2=1/2+2792i$	$Z'=1/2+1625.5i$
460	2793	3253	$Z_1=1/2+460i$	$Z_2=1/2+2793i$	$Z'=1/2+1626.5i$
461	2796	3257	$Z_1=1/2+461i$	$Z_2=1/2+2796i$	$Z'=1/2+1628.5i$
462	2797	3259	$Z_1=1/2+462i$	$Z_2=1/2+2797i$	$Z'=1/2+1629.5i$
463	2808	3271	$Z_1=1/2+463i$	$Z_2=1/2+2808i$	$Z'=1/2+1635.5i$
464	2835	3299	$Z_1=1/2+464i$	$Z_2=1/2+2835i$	$Z'=1/2+1649.5i$
465	2836	3301	$Z_1=1/2+465i$	$Z_2=1/2+2836i$	$Z'=1/2+1650.5i$
466	2841	3307	$Z_1=1/2+466i$	$Z_2=1/2+2841i$	$Z'=1/2+1653.5i$
467	2846	3313	$Z_1=1/2+467i$	$Z_2=1/2+2846i$	$Z'=1/2+1656.5i$
468	2851	3319	$Z_1=1/2+468i$	$Z_2=1/2+2851i$	$Z'=1/2+1659.5i$
469	2854	3323	$Z_1=1/2+469i$	$Z_2=1/2+2854i$	$Z'=1/2+1661.5i$
470	2859	3329	$Z_1=1/2+470i$	$Z_2=1/2+2859i$	$Z'=1/2+1664.5i$
471	2860	3331	$Z_1=1/2+471i$	$Z_2=1/2+2860i$	$Z'=1/2+1665.5i$
472	2871	3343	$Z_1=1/2+472i$	$Z_2=1/2+2871i$	$Z'=1/2+1671.5i$
473	2874	3347	$Z_1=1/2+473i$	$Z_2=1/2+2874i$	$Z'=1/2+1673.5i$
474	2885	3359	$Z_1=1/2+474i$	$Z_2=1/2+2885i$	$Z'=1/2+1679.5i$
475	2886	3361	$Z_1=1/2+475i$	$Z_2=1/2+2886i$	$Z'=1/2+1680.5i$
476	2895	3371	$Z_1=1/2+476i$	$Z_2=1/2+2895i$	$Z'=1/2+1685.5i$
477	2896	3373	$Z_1=1/2+477i$	$Z_2=1/2+2896i$	$Z'=1/2+1686.5i$
478	2911	3389	$Z_1=1/2+478i$	$Z_2=1/2+2911i$	$Z'=1/2+1694.5i$
479	2912	3391	$Z_1=1/2+479i$	$Z_2=1/2+2912i$	$Z'=1/2+1695.5i$

480	2927	3407	$Z_1 = 1/2 + 480i$	$Z_2 = 1/2 + 2927i$	$Z' = 1/2 + 1703.5i$
481	2932	3413	$Z_1 = 1/2 + 481i$	$Z_2 = 1/2 + 2932i$	$Z' = 1/2 + 1706.5i$
482	2951	3433	$Z_1 = 1/2 + 482i$	$Z_2 = 1/2 + 2951i$	$Z' = 1/2 + 1716.5i$
483	2966	3449	$Z_1 = 1/2 + 483i$	$Z_2 = 1/2 + 2966i$	$Z' = 1/2 + 1724.5i$
484	2973	3457	$Z_1 = 1/2 + 484i$	$Z_2 = 1/2 + 2973i$	$Z' = 1/2 + 1728.5i$
485	2976	3461	$Z_1 = 1/2 + 485i$	$Z_2 = 1/2 + 2976i$	$Z' = 1/2 + 1730.5i$
486	2977	3463	$Z_1 = 1/2 + 486i$	$Z_2 = 1/2 + 2977i$	$Z' = 1/2 + 1731.5i$
487	2980	3467	$Z_1 = 1/2 + 487i$	$Z_2 = 1/2 + 2980i$	$Z' = 1/2 + 1733.5i$
488	2981	3469	$Z_1 = 1/2 + 488i$	$Z_2 = 1/2 + 2981i$	$Z' = 1/2 + 1734.5i$
489	3002	3491	$Z_1 = 1/2 + 489i$	$Z_2 = 1/2 + 3002i$	$Z' = 1/2 + 1745.5i$
490	3009	3499	$Z_1 = 1/2 + 490i$	$Z_2 = 1/2 + 3009i$	$Z' = 1/2 + 1749.5i$
491	3020	3511	$Z_1 = 1/2 + 491i$	$Z_2 = 1/2 + 3020i$	$Z' = 1/2 + 1755.5i$
492	3025	3517	$Z_1 = 1/2 + 492i$	$Z_2 = 1/2 + 3025i$	$Z' = 1/2 + 1758.5i$
493	3034	3527	$Z_1 = 1/2 + 493i$	$Z_2 = 1/2 + 3034i$	$Z' = 1/2 + 1763.5i$
494	3035	3529	$Z_1 = 1/2 + 494i$	$Z_2 = 1/2 + 3035i$	$Z' = 1/2 + 1764.5i$
495	3038	3533	$Z_1 = 1/2 + 495i$	$Z_2 = 1/2 + 3038i$	$Z' = 1/2 + 1766.5i$
496	3043	3539	$Z_1 = 1/2 + 496i$	$Z_2 = 1/2 + 3043i$	$Z' = 1/2 + 1769.5i$
497	3044	3541	$Z_1 = 1/2 + 497i$	$Z_2 = 1/2 + 3044i$	$Z' = 1/2 + 1770.5i$
498	3049	3547	$Z_1 = 1/2 + 498i$	$Z_2 = 1/2 + 3049i$	$Z' = 1/2 + 1773.5i$
499	3058	3557	$Z_1 = 1/2 + 499i$	$Z_2 = 1/2 + 3058i$	$Z' = 1/2 + 1778.5i$
500	3059	3559	$Z_1 = 1/2 + 500i$	$Z_2 = 1/2 + 3059i$	$Z' = 1/2 + 1779.5i$
501	3070	3571	$Z_1 = 1/2 + 501i$	$Z_2 = 1/2 + 3070i$	$Z' = 1/2 + 1785.5i$

502	3079	3581	$Z_1=1/2+502i$	$Z_2=1/2+3079i$	$Z'=1/2+1790.5i$
503	3080	3583	$Z_1=1/2+503i$	$Z_2=1/2+3080i$	$Z'=1/2+1791.5i$
504	3089	3593	$Z_1=1/2+504i$	$Z_2=1/2+3089i$	$Z'=1/2+1796.5i$
505	3102	3607	$Z_1=1/2+505i$	$Z_2=1/2+3102i$	$Z'=1/2+1803.5i$
506	3107	3613	$Z_1=1/2+506i$	$Z_2=1/2+3107i$	$Z'=1/2+1806.5i$
507	3110	3617	$Z_1=1/2+507i$	$Z_2=1/2+3110i$	$Z'=1/2+1808.5i$
508	3115	3623	$Z_1=1/2+508i$	$Z_2=1/2+3115i$	$Z'=1/2+1811.5i$
509	3122	3631	$Z_1=1/2+509i$	$Z_2=1/2+3122i$	$Z'=1/2+1815.5i$
510	3127	3637	$Z_1=1/2+510i$	$Z_2=1/2+3127i$	$Z'=1/2+1818.5i$
511	3132	3643	$Z_1=1/2+511i$	$Z_2=1/2+3132i$	$Z'=1/2+1821.5i$
512	3147	3659	$Z_1=1/2+512i$	$Z_2=1/2+3147i$	$Z'=1/2+1829.5i$
513	3158	3671	$Z_1=1/2+513i$	$Z_2=1/2+3158i$	$Z'=1/2+1835.5i$
514	3159	3673	$Z_1=1/2+514i$	$Z_2=1/2+3159i$	$Z'=1/2+1836.5i$
515	3162	3677	$Z_1=1/2+515i$	$Z_2=1/2+3162i$	$Z'=1/2+1838.5i$
516	3175	3691	$Z_1=1/2+516i$	$Z_2=1/2+3175i$	$Z'=1/2+1845.5i$
517	3180	3697	$Z_1=1/2+517i$	$Z_2=1/2+3180i$	$Z'=1/2+1848.5i$
518	3183	3701	$Z_1=1/2+518i$	$Z_2=1/2+3183i$	$Z'=1/2+1850.5i$
519	3190	3709	$Z_1=1/2+519i$	$Z_2=1/2+3190i$	$Z'=1/2+1854.5i$
520	3199	3719	$Z_1=1/2+520i$	$Z_2=1/2+3199i$	$Z'=1/2+1859.5i$
521	3206	3727	$Z_1=1/2+521i$	$Z_2=1/2+3206i$	$Z'=1/2+1863.5i$
522	3211	3733	$Z_1=1/2+522i$	$Z_2=1/2+3211i$	$Z'=1/2+1866.5i$
523	3216	3739	$Z_1=1/2+523i$	$Z_2=1/2+3216i$	$Z'=1/2+1869.5i$

524	3237	3761	$Z_1=1/2+524i$	$Z_2=1/2+3237i$	$Z'=1/2+1880.5i$
525	3242	3767	$Z_1=1/2+525i$	$Z_2=1/2+3242i$	$Z'=1/2+1883.5i$
526	3243	3769	$Z_1=1/2+526i$	$Z_2=1/2+3243i$	$Z'=1/2+1884.5i$
527	3252	3779	$Z_1=1/2+527i$	$Z_2=1/2+3252i$	$Z'=1/2+1889.5i$
528	3265	3793	$Z_1=1/2+528i$	$Z_2=1/2+3265i$	$Z'=1/2+1896.5i$
529	3268	3797	$Z_1=1/2+529i$	$Z_2=1/2+3268i$	$Z'=1/2+1898.5i$
530	3273	3803	$Z_1=1/2+530i$	$Z_2=1/2+3273i$	$Z'=1/2+1901.5i$
531	3290	3821	$Z_1=1/2+531i$	$Z_2=1/2+3290i$	$Z'=1/2+1910.5i$
532	3291	3823	$Z_1=1/2+532i$	$Z_2=1/2+3291i$	$Z'=1/2+1911.5i$
533	3300	3833	$Z_1=1/2+533i$	$Z_2=1/2+3300i$	$Z'=1/2+1916.5i$
534	3313	3847	$Z_1=1/2+534i$	$Z_2=1/2+3313i$	$Z'=1/2+1923.5i$
535	3316	3851	$Z_1=1/2+535i$	$Z_2=1/2+3316i$	$Z'=1/2+1925.5i$
536	3317	3853	$Z_1=1/2+536i$	$Z_2=1/2+3317i$	$Z'=1/2+1926.5i$
537	3326	3863	$Z_1=1/2+537i$	$Z_2=1/2+3326i$	$Z'=1/2+1931.5i$
538	3339	3877	$Z_1=1/2+538i$	$Z_2=1/2+3339i$	$Z'=1/2+1938.5i$
539	3342	3881	$Z_1=1/2+539i$	$Z_2=1/2+3342i$	$Z'=1/2+1940.5i$
540	3349	3889	$Z_1=1/2+540i$	$Z_2=1/2+3349i$	$Z'=1/2+1944.5i$
541	3366	3907	$Z_1=1/2+541i$	$Z_2=1/2+3366i$	$Z'=1/2+1953.5i$
542	3369	3911	$Z_1=1/2+542i$	$Z_2=1/2+3369i$	$Z'=1/2+1955.5i$
543	3374	3917	$Z_1=1/2+543i$	$Z_2=1/2+3374i$	$Z'=1/2+1958.5i$
544	3375	3919	$Z_1=1/2+544i$	$Z_2=1/2+3375i$	$Z'=1/2+1959.5i$
545	3378	3923	$Z_1=1/2+545i$	$Z_2=1/2+3378i$	$Z'=1/2+1961.5i$

546	3383	3929	$Z_1=1/2+546i$	$Z_2=1/2+3383i$	$Z'=1/2+1964.5i$
547	3384	3931	$Z_1=1/2+547i$	$Z_2=1/2+3384i$	$Z'=1/2+1965.5i$
548	3395	3943	$Z_1=1/2+548i$	$Z_2=1/2+3395i$	$Z'=1/2+1971.5i$
549	3398	3947	$Z_1=1/2+549i$	$Z_2=1/2+3398i$	$Z'=1/2+1973.5i$
550	3417	3967	$Z_1=1/2+550i$	$Z_2=1/2+3417i$	$Z'=1/2+1983.5i$
551	3438	3989	$Z_1=1/2+551i$	$Z_2=1/2+3438i$	$Z'=1/2+1994.5i$
552	3449	4001	$Z_1=1/2+552i$	$Z_2=1/2+3449i$	$Z'=1/2+2000.5i$
553	3450	4003	$Z_1=1/2+553i$	$Z_2=1/2+3450i$	$Z'=1/2+2001.5i$
554	3453	4007	$Z_1=1/2+554i$	$Z_2=1/2+3453i$	$Z'=1/2+2003.5i$
555	3458	4013	$Z_1=1/2+555i$	$Z_2=1/2+3458i$	$Z'=1/2+2006.5i$
556	3463	4019	$Z_1=1/2+556i$	$Z_2=1/2+3463i$	$Z'=1/2+2009.5i$
557	3464	4021	$Z_1=1/2+557i$	$Z_2=1/2+3464i$	$Z'=1/2+2010.5i$
558	3469	4027	$Z_1=1/2+558i$	$Z_2=1/2+3469i$	$Z'=1/2+2013.5i$
559	3490	4049	$Z_1=1/2+559i$	$Z_2=1/2+3490i$	$Z'=1/2+2024.5i$
560	3491	4051	$Z_1=1/2+560i$	$Z_2=1/2+3491i$	$Z'=1/2+2025.5i$
561	3496	4057	$Z_1=1/2+561i$	$Z_2=1/2+3496i$	$Z'=1/2+2028.5i$
562	3511	4073	$Z_1=1/2+562i$	$Z_2=1/2+3511i$	$Z'=1/2+2036.5i$
563	3516	4079	$Z_1=1/2+563i$	$Z_2=1/2+3516i$	$Z'=1/2+2039.5i$
564	3527	4091	$Z_1=1/2+564i$	$Z_2=1/2+3527i$	$Z'=1/2+2045.5i$
565	3528	4093	$Z_1=1/2+565i$	$Z_2=1/2+3528i$	$Z'=1/2+2046.5i$
566	3533	4099	$Z_1=1/2+566i$	$Z_2=1/2+3533i$	$Z'=1/2+2049.5i$
567	3544	4111	$Z_1=1/2+567i$	$Z_2=1/2+3544i$	$Z'=1/2+2055.5i$

568	3559	4127	Z_1＝1/2＋568i	Z_2＝1/2＋3559i	Z'＝1/2＋2063.5i
569	3560	4129	Z_1＝1/2＋569i	Z_2＝1/2＋3560i	Z'＝1/2＋2064.5i
570	3563	4133	Z_1＝1/2＋570i	Z_2＝1/2＋3563i	Z'＝1/2＋2066.5i
571	3568	4139	Z_1＝1/2＋571i	Z_2＝1/2＋3568i	Z'＝1/2＋2069.5i
572	3581	4153	Z_1＝1/2＋572i	Z_2＝1/2＋3581i	Z'＝1/2＋2076.5i
573	3584	4157	Z_1＝1/2＋573i	Z_2＝1/2＋3584i	Z'＝1/2＋2078.5i
574	3585	4159	Z_1＝1/2＋574i	Z_2＝1/2＋3885i	Z'＝1/2＋2079.5i
575	3602	4177	Z_1＝1/2＋575i	Z_2＝1/2＋3502i	Z'＝1/2＋2088.5i
576	3625	4201	Z_1＝1/2＋576i	Z_2＝1/2＋3625i	Z'＝1/2＋2100.5i
577	3634	4211	Z_1＝1/2＋577i	Z_2＝1/2＋3634i	Z'＝1/2＋2105.5i
578	3639	4217	Z_1＝1/2＋578i	Z_2＝1/2＋3639i	Z'＝1/2＋2108.5i
579	3640	4219	Z_1＝1/2＋579i	Z_2＝1/2＋3640i	Z'＝1/2＋2109.5i
580	3649	4229	Z_1＝1/2＋580i	Z_2＝1/2＋3649i	Z'＝1/2＋2114.5i
581	3650	4231	Z_1＝1/2＋581i	Z_2＝1/2＋3650i	Z'＝1/2＋2115.5i
582	3659	4241	Z_1＝1/2＋582i	Z_2＝1/2＋3659i	Z'＝1/2＋2120.5i
583	3660	4243	Z_1＝1/2＋583i	Z_2＝1/2＋3660i	Z'＝1/2＋2121.5i
584	3669	4253	Z_1＝1/2＋584i	Z_2＝1/2＋3669i	Z'＝1/2＋2126.5i
585	3674	4259	Z_1＝1/2＋585i	Z_2＝1/2＋3674i	Z'＝1/2＋2129.5i
586	3675	4261	Z_1＝1/2＋586i	Z_2＝1/2＋3675i	Z'＝1/2＋2130.5i
587	3684	4271	Z_1＝1/2＋587i	Z_2＝1/2＋3684i	Z'＝1/2＋2135.5i
588	3685	4273	Z_1＝1/2＋588i	Z_2＝1/2＋3685i	Z'＝1/2＋2136.5i
589	3694	4283	Z_1＝1/2＋589i	Z_2＝1/2＋3694i	Z'＝1/2＋2141.5i

590	3699	4289	$Z_1=1/2+590i$	$Z_2=1/2+3699i$	$Z'=1/2+2144.5i$
591	3706	4297	$Z_1=1/2+591i$	$Z_2=1/2+3706i$	$Z'=1/2+2148.5i$
592	3735	4327	$Z_1=1/2+592i$	$Z_2=1/2+3735i$	$Z'=1/2+2163.5i$
593	3744	4337	$Z_1=1/2+593i$	$Z_2=1/2+3744i$	$Z'=1/2+2168.5i$
594	3745	4339	$Z_1=1/2+594i$	$Z_2=1/2+3745i$	$Z'=1/2+2169.5i$
595	3754	4349	$Z_1=1/2+595i$	$Z_2=1/2+3754i$	$Z'=1/2+2174.5i$
596	3761	4357	$Z_1=1/2+596i$	$Z_2=1/2+3761i$	$Z'=1/2+2178.5i$
597	3766	4363	$Z_1=1/2+597i$	$Z_2=1/2+3766i$	$Z'=1/2+2181.5i$
598	3775	4373	$Z_1=1/2+598i$	$Z_2=1/2+3775i$	$Z'=1/2+2186.5i$
599	3792	4391	$Z_1=1/2+599i$	$Z_2=1/2+3792i$	$Z'=1/2+2195.5i$
600	3797	4397	$Z_1=1/2+600i$	$Z_2=1/2+3797i$	$Z'=1/2+2193.5i$
601	3808	4409	$Z_1=1/2+601i$	$Z_2=1/2+3808i$	$Z'=1/2+2204.5i$
602	3819	4421	$Z_1=1/2+602i$	$Z_2=1/2+3819i$	$Z'=1/2+2210.5i$
603	3820	4423	$Z_1=1/2+603i$	$Z_2=1/2+3820i$	$Z'=1/2+2211.5i$
604	3837	4441	$Z_1=1/2+604i$	$Z_2=1/2+3837i$	$Z'=1/2+2220.5i$
605	3842	4447	$Z_1=1/2+605i$	$Z_2=1/2+3842i$	$Z'=1/2+2223.5i$
606	3845	4451	$Z_1=1/2+606i$	$Z_2=1/2+3845i$	$Z'=1/2+2225.5i$
607	3850	4457	$Z_1=1/2+607i$	$Z_2=1/2+3850i$	$Z'=1/2+2228.5i$
608	3855	4463	$Z_1=1/2+608i$	$Z_2=1/2+3855i$	$Z'=1/2+2231.5i$
609	3872	4481	$Z_1=1/2+609i$	$Z_2=1/2+3872i$	$Z'=1/2+2240.5i$
610	3873	4483	$Z_1=1/2+610i$	$Z_2=1/2+3873i$	$Z'=1/2+2241.5i$
611	3882	4493	$Z_1=1/2+611i$	$Z_2=1/2+3882i$	$Z'=1/2+2246.5i$

612	3895	4507	$Z_1=1/2+612i$	$Z_2=1/2+3895i$	$Z'=1/2+2253.5i$
613	3900	4513	$Z_1=1/2+613i$	$Z_2=1/2+3900i$	$Z'=1/2+2256.5i$
614	3903	4517	$Z_1=1/2+614i$	$Z_2=1/2+3903i$	$Z'=1/2+2258.5i$
615	3904	4519	$Z_1=1/2+615i$	$Z_2=1/2+3904i$	$Z'=1/2+2259.5i$
616	3907	4523	$Z_1=1/2+616i$	$Z_2=1/2+3907i$	$Z'=1/2+2261.5i$
617	3930	4547	$Z_1=1/2+617i$	$Z_2=1/2+3930i$	$Z'=1/2+2273.5i$
618	3931	4549	$Z_1=1/2+618i$	$Z_2=1/2+3931i$	$Z'=1/2+2274.5i$
619	3942	4561	$Z_1=1/2+619i$	$Z_2=1/2+3942i$	$Z'=1/2+2280.5i$
620	3947	4567	$Z_1=1/2+620i$	$Z_2=1/2+3947i$	$Z'=1/2+2283.5i$
621	3962	4583	$Z_1=1/2+621i$	$Z_2=1/2+3962i$	$Z'=1/2+2291.5i$
622	3969	4591	$Z_1=1/2+622i$	$Z_2=1/2+3969i$	$Z'=1/2+2295.5i$
623	3974	4597	$Z_1=1/2+623i$	$Z_2=1/2+3974i$	$Z'=1/2+2298.5i$
624	3979	4603	$Z_1=1/2+624i$	$Z_2=1/2+3979i$	$Z'=1/2+2301.5i$
625	3996	4621	$Z_1=1/2+625i$	$Z_2=1/2+3996i$	$Z'=1/2+2310.5i$
626	4011	4637	$Z_1=1/2+626i$	$Z_2=1/2+4011i$	$Z'=1/2+2318.5i$
627	4012	4639	$Z_1=1/2+627i$	$Z_2=1/2+4012i$	$Z'=1/2+2319.5i$
628	4015	4643	$Z_1=1/2+628i$	$Z_2=1/2+4015i$	$Z'=1/2+2321.5i$
629	4020	4649	$Z_1=1/2+629i$	$Z_2=1/2+4020i$	$Z'=1/2+2324.5i$
630	4021	4651	$Z_1=1/2+630i$	$Z_2=1/2+4021i$	$Z'=1/2+2325.5i$
631	4026	4657	$Z_1=1/2+631i$	$Z_2=1/2+4026i$	$Z'=1/2+2328.5i$
632	4031	4663	$Z_1=1/2+632i$	$Z_2=1/2+4031i$	$Z'=1/2+2331.5i$
633	4040	4673	$Z_1=1/2+633i$	$Z_2=1/2+4040i$	$Z'=1/2+2336.5i$

634	4045	4679	$Z_1=1/2+634i$	$Z_2=1/2+4045i$	$Z'=1/2+2339.5i$
635	4056	4691	$Z_1=1/2+635i$	$Z_2=1/2+4056i$	$Z'=1/2+2345.5i$
636	4067	4703	$Z_1=1/2+636i$	$Z_2=1/2+4067i$	$Z'=1/2+2351.5i$
637	4084	4721	$Z_1=1/2+637i$	$Z_2=1/2+4084i$	$Z'=1/2+2360.5i$
638	4085	4723	$Z_1=1/2+638i$	$Z_2=1/2+4085i$	$Z'=1/2+2361.5i$
639	4090	4729	$Z_1=1/2+639i$	$Z_2=1/2+4090i$	$Z'=1/2+2364.5i$
640	4093	4733	$Z_1=1/2+640i$	$Z_2=1/2+4093i$	$Z'=1/2+2366.5i$
641	4110	4751	$Z_1=1/2+641i$	$Z_2=1/2+4110i$	$Z'=1/2+2375.5i$
642	4117	4759	$Z_1=1/2+642i$	$Z_2=1/2+4117i$	$Z'=1/2+2379.5i$
643	4140	4783	$Z_1=1/2+643i$	$Z_2=1/2+4140i$	$Z'=1/2+2391.5i$
644	4143	4787	$Z_1=1/2+644i$	$Z_2=1/2+4143i$	$Z'=1/2+2393.5i$
645	4144	4789	$Z_1=1/2+645i$	$Z_2=1/2+4144i$	$Z'=1/2+2394.5i$
646	4147	4793	$Z_1=1/2+646i$	$Z_2=1/2+4147i$	$Z'=1/2+2396.5i$
647	4152	4799	$Z_1=1/2+647i$	$Z_2=1/2+4152i$	$Z'=1/2+2399.5i$
648	4153	4801	$Z_1=1/2+648i$	$Z_2=1/2+4153i$	$Z'=1/2+2400.5i$
649	4164	4813	$Z_1=1/2+649i$	$Z_2=1/2+4164i$	$Z'=1/2+2406.5i$
650	4167	4817	$Z_1=1/2+650i$	$Z_2=1/2+4167i$	$Z'=1/2+2408.5i$
651	4180	4831	$Z_1=1/2+651i$	$Z_2=1/2+4180i$	$Z'=1/2+2415.5i$
652	4209	4861	$Z_1=1/2+652i$	$Z_2=1/2+4209i$	$Z'=1/2+2430.5i$
653	4218	4871	$Z_1=1/2+653i$	$Z_2=1/2+4218i$	$Z'=1/2+2435.5i$
654	4223	4877	$Z_1=1/2+654i$	$Z_2=1/2+4223i$	$Z'=1/2+2438.5i$
655	4234	4889	$Z_1=1/2+655i$	$Z_2=1/2+4234i$	$Z'=1/2+2444.5i$

656	4247	4903	$Z_1 = 1/2 + 656i$	$Z_2 = 1/2 + 4247i$	$Z' = 1/2 + 2451.5i$
657	4252	4909	$Z_1 = 1/2 + 657i$	$Z_2 = 1/2 + 4252i$	$Z' = 1/2 + 2454.5i$
658	4261	4919	$Z_1 = 1/2 + 658i$	$Z_2 = 1/2 + 4261i$	$Z' = 1/2 + 2459.5i$
659	4272	4931	$Z_1 = 1/2 + 659i$	$Z_2 = 1/2 + 4272i$	$Z' = 1/2 + 2465.5i$
660	4273	4933	$Z_1 = 1/2 + 660i$	$Z_2 = 1/2 + 4273i$	$Z' = 1/2 + 2466.5i$
661	4276	4937	$Z_1 = 1/2 + 661i$	$Z_2 = 1/2 + 4276i$	$Z' = 1/2 + 2468.5i$
662	4281	4943	$Z_1 = 1/2 + 662i$	$Z_2 = 1/2 + 4281i$	$Z' = 1/2 + 2471.5i$
663	4288	4951	$Z_1 = 1/2 + 663i$	$Z_2 = 1/2 + 4288i$	$Z' = 1/2 + 2475.5i$
664	4293	4957	$Z_1 = 1/2 + 664i$	$Z_2 = 1/2 + 4293i$	$Z' = 1/2 + 2478.5i$
665	4302	4967	$Z_1 = 1/2 + 665i$	$Z_2 = 1/2 + 4302i$	$Z' = 1/2 + 2483.5i$
666	4303	4969	$Z_1 = 1/2 + 666i$	$Z_2 = 1/2 + 4303i$	$Z' = 1/2 + 2484.5i$
667	4306	4973	$Z_1 = 1/2 + 667i$	$Z_2 = 1/2 + 4306i$	$Z' = 1/2 + 2486.5i$
668	4319	4987	$Z_1 = 1/2 + 668i$	$Z_2 = 1/2 + 4319i$	$Z' = 1/2 + 2493.5i$
669	4324	4993	$Z_1 = 1/2 + 669i$	$Z_2 = 1/2 + 4324i$	$Z' = 1/2 + 2496.5i$
670	4329	4999	$Z_1 = 1/2 + 670i$	$Z_2 = 1/2 + 4329i$	$Z' = 1/2 + 2499.5i$
671	4332	5003	$Z_1 = 1/2 + 671i$	$Z_2 = 1/2 + 4332i$	$Z' = 1/2 + 2501.5i$
672	4337	5009	$Z_1 = 1/2 + 672i$	$Z_2 = 1/2 + 4337i$	$Z' = 1/2 + 2504.5i$
673	4338	5011	$Z_1 = 1/2 + 673i$	$Z_2 = 1/2 + 4338i$	$Z' = 1/2 + 2505.5i$
674	4347	5021	$Z_1 = 1/2 + 674i$	$Z_2 = 1/2 + 4347i$	$Z' = 1/2 + 2510.5i$
675	4348	5023	$Z_1 = 1/2 + 675i$	$Z_2 = 1/2 + 4348i$	$Z' = 1/2 + 2511.5i$
676	4363	5039	$Z_1 = 1/2 + 676i$	$Z_2 = 1/2 + 4363i$	$Z' = 1/2 + 2519.5i$
677	4374	5051	$Z_1 = 1/2 + 677i$	$Z_2 = 1/2 + 4374i$	$Z' = 1/2 + 2525.5i$

678	4381	5059	$Z_1 = 1/2 + 678i$	$Z_2 = 1/2 + 4381i$	$Z' = 1/2 + 2529.5i$
679	4398	5077	$Z_1 = 1/2 + 679i$	$Z_2 = 1/2 + 4398i$	$Z' = 1/2 + 2538.5i$
680	4401	5081	$Z_1 = 1/2 + 680i$	$Z_2 = 1/2 + 4041i$	$Z' = 1/2 + 2540.5i$
681	4406	5087	$Z_1 = 1/2 + 681i$	$Z_2 = 1/2 + 4406i$	$Z' = 1/2 + 2543.5i$
682	4417	5099	$Z_1 = 1/2 + 682i$	$Z_2 = 1/2 + 4417i$	$Z' = 1/2 + 2549.5i$
683	4418	5101	$Z_1 = 1/2 + 683i$	$Z_2 = 1/2 + 4418i$	$Z' = 1/2 + 2550.5i$
684	4423	5107	$Z_1 = 1/2 + 684i$	$Z_2 = 1/2 + 4423i$	$Z' = 1/2 + 2553.5i$
685	4428	5113	$Z_1 = 1/2 + 685i$	$Z_2 = 1/2 + 4428i$	$Z' = 1/2 + 2556.5i$
686	4433	5119	$Z_1 = 1/2 + 686i$	$Z_2 = 1/2 + 4433i$	$Z' = 1/2 + 2559.5i$
687	4460	5147	$Z_1 = 1/2 + 687i$	$Z_2 = 1/2 + 4460i$	$Z' = 1/2 + 2573.5i$
688	4465	5153	$Z_1 = 1/2 + 688i$	$Z_2 = 1/2 + 4465i$	$Z' = 1/2 + 2576.5i$
689	4478	5167	$Z_1 = 1/2 + 689i$	$Z_2 = 1/2 + 4478i$	$Z' = 1/2 + 2583.5i$
690	4481	5171	$Z_1 = 1/2 + 690i$	$Z_2 = 1/2 + 4481i$	$Z' = 1/2 + 2585.5i$
691	4488	5179	$Z_1 = 1/2 + 691i$	$Z_2 = 1/2 + 4488i$	$Z' = 1/2 + 2589.5i$
692	4497	5189	$Z_1 = 1/2 + 692i$	$Z_2 = 1/2 + 4497i$	$Z' = 1/2 + 2594.5i$
693	4504	5197	$Z_1 = 1/2 + 693i$	$Z_2 = 1/2 + 4504i$	$Z' = 1/2 + 2598.5i$
694	4515	5209	$Z_1 = 1/2 + 694i$	$Z_2 = 1/2 + 4515i$	$Z' = 1/2 + 2604.5i$
695	4532	5227	$Z_1 = 1/2 + 695i$	$Z_2 = 1/2 + 4532i$	$Z' = 1/2 + 2613.5i$
696	4535	5231	$Z_1 = 1/2 + 696i$	$Z_2 = 1/2 + 4535i$	$Z' = 1/2 + 2615.5i$
697	4536	5233	$Z_1 = 1/2 + 697i$	$Z_2 = 1/2 + 4536i$	$Z' = 1/2 + 2616.5i$
698	4539	5237	$Z_1 = 1/2 + 698i$	$Z_2 = 1/2 + 4539i$	$Z' = 1/2 + 2618.5i$
699	4562	5261	$Z_1 = 1/2 + 699i$	$Z_2 = 1/2 + 4562i$	$Z' = 1/2 + 2630.5i$

700	4573	5273	$Z_1=1/2+700i$	$Z_2=1/2+4573i$	$Z'=1/2+2636.5i$
701	4578	5279	$Z_1=1/2+701i$	$Z_2=1/2+4578i$	$Z'=1/2+2639.5i$
702	4579	5281	$Z_1=1/2+702i$	$Z_2=1/2+4579i$	$Z'=1/2+2640.5i$
703	4594	5297	$Z_1=1/2+703i$	$Z_2=1/2+4594i$	$Z'=1/2+2648.5i$
704	4599	5303	$Z_1=1/2+704i$	$Z_2=1/2+4599i$	$Z'=1/2+2651.5i$
705	4604	5309	$Z_1=1/2+705i$	$Z_2=1/2+4604i$	$Z'=1/2+2654.5i$
706	4617	5323	$Z_1=1/2+706i$	$Z_2=1/2+4617i$	$Z'=1/2+2661.5i$
707	4626	5333	$Z_1=1/2+707i$	$Z_2=1/2+4626i$	$Z'=1/2+2666.5i$
708	4639	5347	$Z_1=1/2+708i$	$Z_2=1/2+4639i$	$Z'=1/2+2673.5i$
709	4642	5351	$Z_1=1/2+709i$	$Z_2=1/2+4642i$	$Z'=1/2+2675.5i$
710	4671	5381	$Z_1=1/2+710i$	$Z_2=1/2+4671i$	$Z'=1/2+2690.5i$
711	4676	5387	$Z_1=1/2+711i$	$Z_2=1/2+4676i$	$Z'=1/2+2693.5i$
712	4681	5393	$Z_1=1/2+712i$	$Z_2=1/2+4681i$	$Z'=1/2+2696.5i$
713	4686	5399	$Z_1=1/2+713i$	$Z_2=1/2+4686i$	$Z'=1/2+2699.5i$
714	4693	5407	$Z_1=1/2+714i$	$Z_2=1/2+4693i$	$Z'=1/2+2703.5i$
715	4698	5413	$Z_1=1/2+715i$	$Z_2=1/2+4698i$	$Z'=1/2+2706.5i$
716	4701	5417	$Z_1=1/2+716i$	$Z_2=1/2+4701i$	$Z'=1/2+2708.5i$
717	4702	5419	$Z_1=1/2+717i$	$Z_2=1/2+4702i$	$Z'=1/2+2709.5i$
718	4713	5431	$Z_1=1/2+718i$	$Z_2=1/2+4713i$	$Z'=1/2+2715.5i$
719	4718	5437	$Z_1=1/2+719i$	$Z_2=1/2+4718i$	$Z'=1/2+2718.5i$
720	4721	5441	$Z_1=1/2+720i$	$Z_2=1/2+472i$	$Z'=1/2+2720.5i$
721	4722	5443	$Z_1=1/2+721i$	$Z_2=1/2+4722i$	$Z'=1/2+2721.5i$

722	4727	5449	$Z_1=1/2+722i$	$Z_2=1/2+4727i$	$Z'=1/2+2724.5i$
723	4748	5471	$Z_1=1/2+723i$	$Z_2=1/2+4748i$	$Z'=1/2+2735.5i$
724	4753	5477	$Z_1=1/2+724i$	$Z_2=1/2+4753i$	$Z'=1/2+2738.5i$
725	4754	5479	$Z_1=1/2+725i$	$Z_2=1/2+4754i$	$Z'=1/2+2739.5i$
726	4757	5483	$Z_1=1/2+726i$	$Z_2=1/2+4757i$	$Z'=1/2+2741.5i$
727	4774	5501	$Z_1=1/2+727i$	$Z_2=1/2+4774i$	$Z'=1/2+2750.5i$
728	4775	5503	$Z_1=1/2+728i$	$Z_2=1/2+4775i$	$Z'=1/2+2751.5i$
729	4778	5507	$Z_1=1/2+729i$	$Z_2=1/2+4778i$	$Z'=1/2+2753.5i$
730	4789	5519	$Z_1=1/2+730i$	$Z_2=1/2+4789i$	$Z'=1/2+2759.5i$
731	4790	5521	$Z_1=1/2+731i$	$Z_2=1/2+4790i$	$Z'=1/2+2760.5i$
732	4795	5527	$Z_1=1/2+732i$	$Z_2=1/2+4795i$	$Z'=1/2+2763.5i$
733	4798	5531	$Z_1=1/2+733i$	$Z_2=1/2+4798i$	$Z'=1/2+2765.5i$
734	4823	5557	$Z_1=1/2+734i$	$Z_2=1/2+4823i$	$Z'=1/2+2778.5i$
735	4828	5563	$Z_1=1/2+735i$	$Z_2=1/2+4828i$	$Z'=1/2+2781.5i$
736	4833	5569	$Z_1=1/2+736i$	$Z_2=1/2+4833i$	$Z'=1/2+2784.5i$
737	4836	5573	$Z_1=1/2+737i$	$Z_2=1/2+4836i$	$Z'=1/2+2786.5i$
738	4843	5581	$Z_1=1/2+738i$	$Z_2=1/2+4843i$	$Z'=1/2+2790.5i$
739	4852	5591	$Z_1=1/2+739i$	$Z_2=1/2+4852i$	$Z'=1/2+2795.5i$
740	4883	5623	$Z_1=1/2+740i$	$Z_2=1/2+4883i$	$Z'=1/2+2811.5i$
741	4898	5639	$Z_1=1/2+741i$	$Z_2=1/2+4898i$	$Z'=1/2+2819.5i$
742	4899	5641	$Z_1=1/2+742i$	$Z_2=1/2+4899i$	$Z'=1/2+2820.5i$
743	4904	5647	$Z_1=1/2+743i$	$Z_2=1/2+4904i$	$Z'=1/2+2823.5i$

744	4907	5651	$Z_1=1/2+744i$	$Z_2=1/2+4907i$	$Z'=1/2+2825.5i$
745	4908	5653	$Z_1=1/2+745i$	$Z_2=1/2+4908i$	$Z'=1/2+2826.5i$
746	4911	5657	$Z_1=1/2+746i$	$Z_2=1/2+4911i$	$Z'=1/2+2828.5i$
747	4912	5659	$Z_1=1/2+747i$	$Z_2=1/2+4912i$	$Z'=1/2+2829.5i$
748	4921	5669	$Z_1=1/2+748i$	$Z_2=1/2+4921i$	$Z'=1/2+2834.5i$
749	4934	5683	$Z_1=1/2+749i$	$Z_2=1/2+4934i$	$Z'=1/2+2841.5i$
750	4939	5689	$Z_1=1/2+750i$	$Z_2=1/2+4939i$	$Z'=1/2+2844.5i$
751	4942	5693	$Z_1=1/2+751i$	$Z_2=1/2+4942i$	$Z'=1/2+2846.5i$
752	4949	5701	$Z_1=1/2+752i$	$Z_2=1/2+4949i$	$Z'=1/2+2850.5i$
753	4958	5711	$Z_1=1/2+753i$	$Z_2=1/2+4958i$	$Z'=1/2+2855.5i$
754	4963	5717	$Z_1=1/2+754i$	$Z_2=1/2+4963i$	$Z'=1/2+2858.5i$
755	4982	5737	$Z_1=1/2+755i$	$Z_2=1/2+4982i$	$Z'=1/2+2868.5i$
756	4985	5741	$Z_1=1/2+756i$	$Z_2=1/2+4985i$	$Z'=1/2+2870.5i$
757	4986	5743	$Z_1=1/2+757i$	$Z_2=1/2+4986i$	$Z'=1/2+2871.5i$
758	4991	5749	$Z_1=1/2+758i$	$Z_2=1/2+4991i$	$Z'=1/2+2874.5i$
759	5020	5779	$Z_1=1/2+759i$	$Z_2=1/2+5020i$	$Z'=1/2+2889.5i$
760	5023	5783	$Z_1=1/2+760i$	$Z_2=1/2+5023i$	$Z'=1/2+2891.5i$
761	5030	5791	$Z_1=1/2+761i$	$Z_2=1/2+5030i$	$Z'=1/2+2895.5i$
762	5039	5801	$Z_1=\frac{1}{2}+762i$	$Z_2=1/2+5039i$	$Z'=1/2+2900.5i$
763	5044	5807	$Z_1=1/2+763i$	$Z_2=1/2+5044i$	$Z'=1/2+2903.5i$
764	5049	5813	$Z_1=1/2+764i$	$Z_2=1/2+5049i$	$Z'=1/2+2906.5i$
765	5056	5821	$Z_1=1/2+765i$	$Z_2=1/2+5056i$	$Z'=1/2+2910.5i$

766	5061	5827	$Z_1=1/2+766i$	$Z_2=1/2+5061i$	$Z'=1/2+2913.5i$
767	5072	5839	$Z_1=1/2+767i$	$Z_2=1/2+5072i$	$Z'=1/2+2919.5i$
768	5075	5843	$Z_1=1/2+768i$	$Z_2=1/2+5075i$	$Z'=1/2+2921.5i$
769	5080	5849	$Z_1=1/2+769i$	$Z_2=1/2+5080i$	$Z'=1/2+2924.5i$
770	5081	5851	$Z_1=1/2+770i$	$Z_2=1/2+5081i$	$Z'=1/2+2925.5i$
771	5086	5857	$Z_1=1/2+771i$	$Z_2=1/2+5086i$	$Z'=1/2+2978.5i$
772	5089	5861	$Z_1=1/2+772i$	$Z_2=1/2+5089i$	$Z'=1/2+2930.5i$
773	5094	5867	$Z_1=1/2+773i$	$Z_2=1/2+5094i$	$Z'=1/2+2933.5i$
774	5095	5869	$Z_1=1/2+774i$	$Z_2=1/2+5095i$	$Z'=1/2+2934.5i$
775	5104	5879	$Z_1=1/2+775i$	$Z_2=1/2+5104i$	$Z'=1/2+2939.5i$
776	5105	5881	$Z_1=1/2+776i$	$Z_2=1/2+5105i$	$Z'=1/2+2940.5i$
777	5120	5897	$Z_1=1/2+777i$	$Z_2=1/2+5120i$	$Z'=1/2+2948.5i$
778	5125	5903	$Z_1=1/2+778i$	$Z_2=1/2+5125i$	$Z'=1/2+2951.5i$
779	5144	5923	$Z_1=1/2+779i$	$Z_2=1/2+5144i$	$Z'=1/2+2961.5i$
780	5147	5927	$Z_1=1/2+780i$	$Z_2=1/2+5147i$	$Z'=1/2+2963.5i$
781	5158	5939	$Z_1=1/2+781i$	$Z_2=1/2+5158i$	$Z'=1/2+2969.5i$
782	5171	5953	$Z_1=1/2+782i$	$Z_2=1/2+5171i$	$Z'=1/2+2976.5i$
783	5198	5981	$Z_1=1/2+783i$	$Z_2=1/2+5198i$	$Z'=1/2+2990.5i$
784	5203	5987	$Z_1=1/2+784i$	$Z_2=1/2+5203i$	$Z'=1/2+2993.5i$
785	5222	6007	$Z_1=1/2+785i$	$Z_2=1/2+5222i$	$Z'=1/2+3003.5i$
786	5225	6011	$Z_1=1/2+786i$	$Z_2=1/2+5225i$	$Z'=1/2+3005.5i$
787	5242	6029	$Z_1=1/2+787i$	$Z_2=1/2+5242i$	$Z'=1/2+3014.5i$

788	5249	6037	$Z_1 = 1/2 + 788i$	$Z_2 = 1/2 + 5249i$	$Z' = 1/2 + 3018.5i$
789	5254	6043	$Z_1 = 1/2 + 789i$	$Z_2 = 1/2 + 5354i$	$Z' = 1/2 + 3021.5i$
790	5257	6047	$Z_1 = 1/2 + 790i$	$Z_2 = 1/2 + 5257i$	$Z' = 1/2 + 3023.5i$
791	5262	6053	$Z_1 = 1/2 + 791i$	$Z_2 = 1/2 + 5262i$	$Z' = 1/2 + 3026.5i$
792	5275	6067	$Z_1 = 1/2 + 792i$	$Z_2 = 1/2 + 5275i$	$Z' = 1/2 + 3033.5i$
793	5280	6073	$Z_1 = 1/2 + 793i$	$Z_2 = 1/2 + 5280i$	$Z' = 1/2 + 3036.5i$
794	5285	6079	$Z_1 = 1/2 + 794i$	$Z_2 = 1/2 + 8285i$	$Z' = 1/2 + 3039.5i$
795	5294	6089	$Z_1 = 1/2 + 795i$	$Z_2 = 1/2 + 5294i$	$Z' = 1/2 + 3044.5i$
796	5295	6091	$Z_1 = 1/2 + 796i$	$Z_2 = 1/2 + 5295i$	$Z' = 1/2 + 3045.5i$
797	5304	6101	$Z_1 = 1/2 + 797i$	$Z_2 = 1/2 + 5304i$	$Z' = 1/2 + 3050.5i$
798	5315	6113	$Z_1 = 1/2 + 798i$	$Z_2 = 1/2 + 5315i$	$Z' = 1/2 + 3056.5i$
799	5322	6121	$Z_1 = 1/2 + 799i$	$Z_2 = 1/2 + 5322i$	$Z' = 1/2 + 3060.5i$
800	5331	6131	$Z_1 = 1/2 + 800i$	$Z_2 = 1/2 + 5331i$	$Z' = 1/2 + 3065.5i$
801	5332	6133	$Z_1 = 1/2 + 801i$	$Z_2 = 1/2 + 5332i$	$Z' = 1/2 + 3066.5i$
802	5341	6143	$Z_1 = 1/2 + 802i$	$Z_2 = 1/2 + 5341i$	$Z' = 1/2 + 3071.5i$
803	5348	6151	$Z_1 = 1/2 + 803i$	$Z_2 = 1/2 + 5348i$	$Z' = 1/2 + 3075.5i$
804	5359	6163	$Z_1 = 1/2 + 804i$	$Z_2 = 1/2 + 5359i$	$Z' = 1/2 + 3081.5i$
805	5368	6173	$Z_1 = 1/2 + 805i$	$Z_2 = 1/2 + 5368i$	$Z' = 1/2 + 3086.5i$
806	5391	6197	$Z_1 = 1/2 + 806i$	$Z_2 = 1/2 + 5391i$	$Z' = 1/2 + 3098.5i$
807	5392	6199	$Z_1 = 1/2 + 807i$	$Z_2 = 1/2 + 5392i$	$Z' = 1/2 + 3099.5i$
808	5395	6203	$Z_1 = 1/2 + 808i$	$Z_2 = 1/2 + 5395i$	$Z' = 1/2 + 3101.5i$
809	5402	6211	$Z_1 = 1/2 + 809i$	$Z_2 = 1/2 + 5402i$	$Z' = 1/2 + 3105.5i$

810	5407	6217	$Z_1=1/2+810i$	$Z_2=1/2+5407i$	$Z'=1/2+3108.5i$
811	5410	6221	$Z_1=1/2+811i$	$Z_2=1/2+5410i$	$Z'=1/2+3110.5i$
812	5417	6229	$Z_1=1/2+812i$	$Z_2=1/2+5417i$	$Z'=1/2+3114.5i$
813	5434	6247	$Z_1=1/2+813i$	$Z_2=1/2+5434i$	$Z'=1/2+3123.5i$
814	5443	6257	$Z_1=1/2+814i$	$Z_2=1/2+5443i$	$Z'=1/2+3128.5i$
815	5448	6263	$Z_1=1/2+815i$	$Z_2=1/2+5448i$	$Z'=1/2+3131.5i$
816	5453	6269	$Z_1=1/2+816i$	$Z_2=1/2+5453i$	$Z'=1/2+3134.5i$
817	5454	6271	$Z_1=1/2+817i$	$Z_2=1/2+5454i$	$Z'=1/2+3135.5i$
818	5459	6277	$Z_1=1/2+818i$	$Z_2=1/2+5459i$	$Z'=1/2+3138.5i$
819	5468	6287	$Z_1=1/2+819i$	$Z_2=1/2+5468i$	$Z'=1/2+3143.5i$
820	5479	6299	$Z_1=1/2+820i$	$Z_2=1/2+5479i$	$Z'=1/2+3149.5i$
821	5480	6301	$Z_1=1/2+821i$	$Z_2=1/2+5480i$	$Z'=1/2+3150.5i$
822	5489	6311	$Z_1=1/2+822i$	$Z_2=1/2+5489i$	$Z'=1/2+3155.5i$
823	5494	6317	$Z_1=1/2+823i$	$Z_2=1/2+5494i$	$Z'=1/2+3158.5i$
824	5499	6323	$Z_1=1/2+824i$	$Z_2=1/2+5499i$	$Z'=1/2+3161.5i$
825	5504	6329	$Z_1=1/2+825i$	$Z_2=1/2+5504i$	$Z'=1/2+3164.5i$
826	5511	6337	$Z_1=1/2+826i$	$Z_2=1/2+5511i$	$Z'=1/2+3168.5i$
827	5516	6343	$Z_1=1/2+827i$	$Z_2=1/2+5516i$	$Z'=1/2+3171.5i$
828	5525	6353	$Z_1=1/2+828i$	$Z_2=1/2+5525i$	$Z'=1/2+3176.5i$
829	5530	6359	$Z_1=1/2+829i$	$Z_2=1/2+5530i$	$Z'=1/2+3179.5i$
830	5531	6361	$Z_1=1/2+830i$	$Z_2=1/2+5531i$	$Z'=1/2+3180.5i$
831	5536	6367	$Z_1=1/2+831i$	$Z_2=1/2+5536i$	$Z'=1/2+3183.5i$

832	5541	6373	$Z_1=1/2+832i$	$Z_2=1/2+5541i$	$Z'=1/2+3186.5i$
833	5546	6379	$Z_1=1/2+833i$	$Z_2=1/2+5546i$	$Z'=1/2+3189.5i$
834	5555	6389	$Z_1=1/2+834i$	$Z_2=1/2+5555i$	$Z'=1/2+3194.5i$
835	5562	6397	$Z_1=1/2+835i$	$Z_2=1/2+5562i$	$Z'=1/2+3198.5i$
836	5585	6421	$Z_1=1/2+836i$	$Z_2=1/2+5585i$	$Z'=1/2+3210.5i$
837	5590	6427	$Z_1=1/2+837i$	$Z_2=1/2+5590i$	$Z'=1/2+3213.5i$
838	5611	6449	$Z_1=1/2+838i$	$Z_2=1/2+5611i$	$Z'=1/2+3224.5i$
839	5612	6451	$Z_1=1/2+839i$	$Z_2=1/2+5612i$	$Z'=1/2+3225.5i$
840	5629	6469	$Z_1=1/2+840i$	$Z_2=1/2+5629i$	$Z'=1/2+3234.5i$
841	5632	6473	$Z_1=1/2+841i$	$Z_2=1/2+5632i$	$Z'=1/2+3236.5i$
842	5639	6481	$Z_1=1/2+842i$	$Z_2=1/2+5639i$	$Z'=1/2+3240.5i$
843	5648	6491	$Z_1=1/2+843i$	$Z_2=1/2+5648i$	$Z'=1/2+3245.5i$
844	5677	6521	$Z_1=1/2+844i$	$Z_2=1/2+5677i$	$Z'=1/2+3260.5i$
845	5684	6529	$Z_1=1/2+845i$	$Z_2=1/2+5684i$	$Z'=1/2+3264.5i$
846	5701	6547	$Z_1=1/2+846i$	$Z_2=1/2+5701i$	$Z'=1/2+3273.5i$
847	5704	6551	$Z_1=1/2+847i$	$Z_2=1/2+5704i$	$Z'=1/2+3275.5i$
848	5705	6553	$Z_1=1/2+848i$	$Z_2=1/2+5705i$	$Z'=1/2+3276.5i$
849	5714	6563	$Z_1=1/2+849i$	$Z_2=1/2+5714i$	$Z'=1/2+3281.5i$
850	5719	6569	$Z_1=1/2+850i$	$Z_2=1/2+5719i$	$Z'=1/2+3284.5i$
851	5720	6571	$Z_1=1/2+851i$	$Z_2=1/2+5720i$	$Z'=1/2+3285.5i$
852	5725	6577	$Z_1=1/2+852i$	$Z_2=1/2+5725i$	$Z'=1/2+3288.5i$
853	5728	6581	$Z_1=1/2+853i$	$Z_2=1/2+5728i$	$Z'=1/2+3290.5i$

854	5745	6599	$Z_1=1/2+854i$	$Z_2=1/2+5745i$	$Z'=1/2+3299.5i$
855	5752	6607	$Z_1=1/2+855i$	$Z_2=1/2+5752i$	$Z'=1/2+3303.5i$
856	5763	6619	$Z_1=1/2+856i$	$Z_2=1/2+5763i$	$Z'=1/2+3309.5i$
857	5780	6637	$Z_1=1/2+857i$	$Z_2=1/2+5780i$	$Z'=1/2+3318.5i$
858	5795	6653	$Z_1=1/2+858i$	$Z_2=1/2+5795i$	$Z'=1/2+3326.5i$
859	5800	6659	$Z_1=1/2+859i$	$Z_2=1/2+5800i$	$Z'=1/2+3329.5i$
860	5801	6661	$Z_1=1/2+860i$	$Z_2=1/2+5801i$	$Z'=1/2+3330.5i$
861	5812	6673	$Z_1=1/2+861i$	$Z_2=1/2+5812i$	$Z'=1/2+3336.5i$
862	5817	6679	$Z_1=1/2+862i$	$Z_2=1/2+5817i$	$Z'=1/2+3339.5i$
863	5826	6689	$Z_1=1/2+863i$	$Z_2=1/2+5826i$	$Z'=1/2+3344.5i$
864	5827	6691	$Z_1=1/2+864i$	$Z_2=1/2+5827i$	$Z'=1/2+3345.5i$
865	5836	6701	$Z_1=1/2+865i$	$Z_2=1/2+5836i$	$Z'=1/2+3350.5i$
866	5837	6703	$Z_1=1/2+866i$	$Z_2=1/2+5837i$	$Z'=1/2+3351.5i$
867	5842	6709	$Z_1=1/2+867i$	$Z_2=1/2+5842i$	$Z'=1/2+3354.5i$
868	5851	6719	$Z_1=1/2+868i$	$Z_2=1/2+5851i$	$Z'=1/2+3359.5i$
869	5864	6733	$Z_1=1/2+869i$	$Z_2=1/2+5864i$	$Z'=1/2+3366.5i$
870	5867	6737	$Z_1=1/2+870i$	$Z_2=1/2+5867i$	$Z'=1/2+3368.5i$
871	5890	6761	$Z_1=1/2+871i$	$Z_2=1/2+5890i$	$Z'=1/2+3380.5i$
872	5891	6763	$Z_1=1/2+872i$	$Z_2=1/2+5891i$	$Z'=1/2+3381.5i$
873	5906	6779	$Z_1=1/2+873i$	$Z_2=1/2+5906i$	$Z'=1/2+3389.5i$
874	5907	6781	$Z_1=1/2+874i$	$Z_2=1/2+5907i$	$Z'=1/2+3390.5i$
875	5916	6791	$Z_1=1/2+875i$	$Z_2=1/2+5916i$	$Z'=1/2+3395.5i$

876	5917	6793	$Z_1=1/2+876i$	$Z_2=1/2+5917i$	$Z'=1/2+3396.5i$
877	5926	6803	$Z_1=1/2+877i$	$Z_2=1/2+5926i$	$Z'=1/2+3401.5i$
878	5945	6823	$Z_1=1/2+878i$	$Z_2=1/2+5945i$	$Z'=1/2+3411.5i$
879	5948	6827	$Z_1=1/2+879i$	$Z_2=1/2+5948i$	$Z'=1/2+3413.5i$
880	5949	6829	$Z_1=1/2+880i$	$Z_2=1/2+5949i$	$Z'=1/2+3414.5i$
881	5952	6833	$Z_1=1/2+881i$	$Z_2=1/2+5952i$	$Z'=1/2+3416.5i$
882	5959	6841	$Z_1=1/2+882i$	$Z_2=1/2+5959i$	$Z'=1/2+3420.5i$
883	5974	6857	$Z_1=1/2+883i$	$Z_2=1/2+5974i$	$Z'=1/2+3428.5i$
884	5979	6863	$Z_1=1/2+884i$	$Z_2=1/2+5979i$	$Z'=1/2+3431.5i$
885	5984	6869	$Z_1=1/2+885i$	$Z_2=1/2+5984i$	$Z'=1/2+3434.5i$
886	5985	6871	$Z_1=1/2+886i$	$Z_2=1/2+5985i$	$Z'=1/2+3435.5i$
887	5996	6883	$Z_1=1/2+887i$	$Z_2=1/2+5996i$	$Z'=1/2+3441.5i$
888	6011	6899	$Z_1=1/2+888i$	$Z_2=1/2+6011i$	$Z'=1/2+3449.5i$
889	6018	6907	$Z_1=1/2+889i$	$Z_2=1/2+6018i$	$Z'=1/2+3453.5i$
890	6021	6911	$Z_1=1/2+890i$	$Z_2=1/2+6021i$	$Z'=1/2+3455.5i$
891	6026	6917	$Z_1=1/2+891i$	$Z_2=1/2+6026i$	$Z'=1/2+3458.5i$
892	6055	6947	$Z_1=1/2+892i$	$Z_2=1/2+6055i$	$Z'=1/2+3473.5i$
893	6056	6949	$Z_1=1/2+893i$	$Z_2=1/2+6056i$	$Z'=1/2+3474.5i$
894	6065	6959	$Z_1=1/2+894i$	$Z_2=1/2+6065i$	$Z'=1/2+3479.5i$
895	6066	6961	$Z_1=1/2+895i$	$Z_2=1/2+6066i$	$Z'=1/2+3480.5i$
896	6071	6967	$Z_1=1/2+896i$	$Z_2=1/2+6071i$	$Z'=1/2+3483.5i$
897	6074	6971	$Z_1=1/2+897i$	$Z_2=1/2+6074i$	$Z'=1/2+3485.5i$

898	6079	6977	Z_1＝1/2＋898i	Z_2＝1/2＋6079i	Z'＝1/2＋3488.5i
899	6084	6983	Z_1＝1/2＋899i	Z_2＝1/2＋6084i	Z'＝1/2＋3491.5i
900	6091	6991	Z_1＝1/2＋900i	Z_2＝1/2＋6091i	Z'＝1/2＋3495.5i
901	6096	6997	Z_1＝1/2＋901i	Z_2＝1/2＋6096i	Z'＝1/2＋3498.5i
902	6099	7001	Z_1＝1/2＋902i	Z_2＝1/2＋6099i	Z'＝1/2＋3500.5i
903	6110	7013	Z_1＝1/2＋903i	Z_2＝1/2＋6110i	Z'＝1/2＋3506.5i
904	6115	7019	Z_1＝1/2＋904i	Z_2＝1/2＋6115i	Z'＝1/2＋3509.5i
905	6122	7027	Z_1＝1/2＋905i	Z_2＝1/2＋6122i	Z'＝1/2＋3513.5i
906	6133	7039	Z_1＝1/2＋906i	Z_2＝1/2＋6133i	Z'＝1/2＋3519.5i
907	6136	7043	Z_1＝1/2＋907i	Z_2＝1/2＋6136i	Z'＝1/2＋3521.5i
908	6149	7057	Z_1＝1/2＋908i	Z_2＝1/2＋6149i	Z'＝1/235280.5i
909	6160	7069	Z_1＝1/2＋909i	Z_2＝1/2＋6160i	Z'＝1/2＋3534.5i
910	6169	7079	Z_1＝1/2＋910i	Z_2＝1/2＋6169i	Z'＝1/2＋3539.5i
911	6192	7103	Z_1＝1/2＋911i	Z_2＝1/2＋6192i	Z'＝1/2＋3551.5i
912	6197	7109	Z_1＝1/2＋912i	Z_2＝1/2＋6197i	Z'＝1/2＋3554.5i
913	6208	7121	Z_1＝1/2＋913i	Z_2＝1/2＋6208i	Z'＝1/2＋3560.5i
914	6213	7127	Z_1＝1/2＋914i	Z_2＝1/2＋6213i	Z'＝1/2＋3563.5i
915	6214	7129	Z_1＝1/2＋915i	Z_2＝1/2＋6214i	Z'＝1/2＋3564.5i
916	6235	7151	Z_1＝1/2＋916i	Z_2＝1/2＋6235i	Z'＝1/2＋3575.5i
917	6242	7159	Z_1＝1/2＋917i	Z_2＝1/2＋6242i	Z'＝1/2＋3579.5i
918	6259	7177	Z_1＝1/2＋918i	Z_2＝1/2＋6259i	Z'＝1/2＋3588.5i
919	6268	7187	Z_1＝1/2＋919i	Z_2＝1/2＋6268i	Z'＝1/2＋3593.5i

920	6273	7193	$Z_1 = 1/2 + 920i$	$Z_2 = 1/2 + 6273i$	$Z' = 1/2 + 3596.5i$
921	6286	7207	$Z_1 = 1/2 + 921i$	$Z_2 = 1/2 + 6286i$	$Z' = 1/2 + 3603.5i$
922	6289	7211	$Z_1 = 1/2 + 922i$	$Z_2 = 1/2 + 6289i$	$Z' = 1/2 + 3605.5i$
923	6290	7213	$Z_1 = 1/2 + 923i$	$Z_2 = 1/2 + 6290i$	$Z' = 1/2 + 3606.5i$
924	6295	7219	$Z_1 = 1/2 + 924i$	$Z_2 = 1/2 + 6295i$	$Z' = 1/2 + 3609.5i$
925	6304	7229	$Z_1 = 1/2 + 925i$	$Z_2 = 1/2 + 6304i$	$Z' = 1/2 + 3614.5i$
926	6311	7237	$Z_1 = 1/2 + 926i$	$Z_2 = 1/2 + 6311i$	$Z' = 1/2 + 3618.5i$
927	6316	7243	$Z_1 = 1/2 + 927i$	$Z_2 = 1/2 + 6316i$	$Z' = 1/2 + 3621.5i$
928	6319	7247	$Z_1 = 1/2 + 928i$	$Z_2 = 1/2 + 6319i$	$Z' = 1/2 + 3623.5i$
929	6324	7253	$Z_1 = 1/2 + 929i$	$Z_2 = 1/2 + 6324i$	$Z' = 1/2 + 3626.5i$
930	6353	7283	$Z_1 = 1/2 + 930i$	$Z_2 = 1/2 + 6353i$	$Z' = 1/2 + 3641.5i$
931	6366	7297	$Z_1 = 1/2 + 931i$	$Z_2 = 1/2 + 6366i$	$Z' = 1/2 + 3648.5i$
932	6375	7307	$Z_1 = 1/2 + 932i$	$Z_2 = 1/2 + 6375i$	$Z' = 1/2 + 3653.5i$
933	6376	7309	$Z_1 = 1/2 + 933i$	$Z_2 = 1/2 + 6376i$	$Z' = 1/2 + 3654.5i$
934	6387	7321	$Z_1 = 1/2 + 934i$	$Z_2 = 1/2 + 6387i$	$Z' = 1/2 + 3660.5i$
935	6396	7331	$Z_1 = 1/2 + 935i$	$Z_2 = 1/2 + 6396i$	$Z' = 1/2 + 3665.5i$
936	6397	7333	$Z_1 = 1/2 + 936i$	$Z_2 = 1/2 + 6397i$	$Z' = 1/2 + 3666.5i$
937	6412	7349	$Z_1 = 1/2 + 937i$	$Z_2 = 1/2 + 6412i$	$Z' = 1/2 + 3674.5i$
938	6413	7351	$Z_1 = 1/2 + 938i$	$Z_2 = 1/2 + 6413i$	$Z' = 1/2 + 3675.5i$
939	6430	7369	$Z_1 = 1/2 + 939i$	$Z_2 = 1/2 + 6430i$	$Z' = 1/2 + 3684.5i$
940	6453	7393	$Z_1 = 1/2 + 940i$	$Z_2 = 1/2 + 6453i$	$Z' = 1/2 + 3696.5i$
941	6470	7411	$Z_1 = 1/2 + 941i$	$Z_2 = 1/2 + 6470i$	$Z' = 1/2 + 3705.5i$

942	6475	7417	$Z_1=1/2+942i$	$Z_2=1/2+6475i$	$Z'=1/2+3708.5i$
943	6490	7433	$Z_1=1/2+943i$	$Z_2=1/2+6490i$	$Z'=1/2+3716.5i$
944	6507	7451	$Z_1=1/2+944i$	$Z_2=1/2+6507i$	$Z'=1/2+3725.5i$
945	6512	7457	$Z_1=1/2+945i$	$Z_2=1/2+6512i$	$Z'=1/2+3728.5i$
946	6513	7459	$Z_1=1/2+946i$	$Z_2=1/2+6513i$	$Z'=1/2+3729.5i$
947	6530	7477	$Z_1=1/2+947i$	$Z_2=1/2+6530i$	$Z'=1/2+3738.5i$
948	6533	7481	$Z_1=1/2+948i$	$Z_2=1/2+6533i$	$Z'=1/2+3740.5i$
949	6538	7487	$Z_1=1/2+949i$	$Z_2=1/2+6538i$	$Z'=1/2+3743.5i$
950	6539	7489	$Z_1=1/2+950i$	$Z_2=1/2+6539i$	$Z'=1/2+3744.5i$
951	6548	7499	$Z_1=1/2+951i$	$Z_2=1/2+6548i$	$Z'=1/2+3749.5i$
952	6555	7507	$Z_1=1/2+952i$	$Z_2=1/2+6555i$	$Z'=1/2+3753.5i$
953	6564	7517	$Z_1=1/2+953i$	$Z_2=1/2+6564i$	$Z'=1/2+3758.5i$
954	6569	7523	$Z_1=1/2+954i$	$Z_2=1/2+6569i$	$Z'=1/2+3761.5i$
955	6574	7529	$Z_1=1/2+955i$	$Z_2=1/2+6574i$	$Z'=1/2+3764.5i$
956	6581	7537	$Z_1=1/2+956i$	$Z_2=1/2+6581i$	$Z'=1/2+3768.5i$
957	6584	7541	$Z_1=1/2+957i$	$Z_2=1/2+6584i$	$Z'=1/2+3770.5i$
958	6589	7547	$Z_1=1/2+958i$	$Z_2=1/2+6589i$	$Z'=1/2+3773.5i$
959	6590	7549	$Z_1=1/2+959i$	$Z_2=1/2+6590i$	$Z'=1/2+3774.5i$
960	6599	7559	$Z_1=1/2+960i$	$Z_2=1/2+6599i$	$Z'=1/2+3779.5i$
961	6600	7561	$Z_1=1/2+961i$	$Z_2=1/2+6600i$	$Z'=1/2+37780.5i$
962	6611	7573	$Z_1=1/2+962i$	$Z_2=1/2+6611i$	$Z'=1/2+3786.5i$
963	6614	7577	$Z_1=1/2+963i$	$Z_2=1/2+6614i$	$Z'=1/2+3788.5i$

964	6619	7583	$Z_1=1/2+964i$	$Z_2=1/2+6619i$	$Z'=1/2+3791.5i$
965	6624	7589	$Z_1=1/2+965i$	$Z_2=1/2+6624i$	$Z'=1/2+3794.5i$
966	6625	7591	$Z_1=1/2+966i$	$Z_2=1/2+6625i$	$Z'=1/2+3795.5i$
967	6636	7603	$Z_1=1/2+967i$	$Z_2=1/2+6636i$	$Z'=1/2+3801.5i$
968	6639	7607	$Z_1=1/2+968i$	$Z_2=1/2+6639i$	$Z'=1/2+3803.5i$
969	6652	7621	$Z_1=1/2+969i$	$Z_2=1/2+6652i$	$Z'=1/2+3810.5i$
970	6669	7639	$Z_1=1/2+970i$	$Z_2=1/2+6669i$	$Z'=1/2+3819.5i$
971	6672	7643	$Z_1=1/2+971i$	$Z_2=1/2+6672i$	$Z'=1/2+3821.5i$
972	6677	7649	$Z_1=1/2+972i$	$Z_2=1/2+6677i$	$Z'=1/2+3824.5i$
973	6696	7669	$Z_1=1/2+973i$	$Z_2=1/2+6696i$	$Z'=1/2+3834.5i$
974	6699	7673	$Z_1=1/2+974i$	$Z_2=1/2+6699i$	$Z'=1/2+3836.5i$
975	6706	7681	$Z_1=1/2+975i$	$Z_2=1/2+6706i$	$Z'=1/2+3840.5i$
976	6711	7687	$Z_1=1/2+976i$	$Z_2=1/2+6711i$	$Z'=1/2+3843.5i$
977	6714	7691	$Z_1=1/2+977i$	$Z_2=1/2+6714i$	$Z'=1/2+3845.5i$
978	6721	7699	$Z_1=1/2+978i$	$Z_2=1/2+6721i$	$Z'=1/2+3849.5i$
979	6724	7703	$Z_1=1/2+979i$	$Z_2=1/2+6724i$	$Z'=1/2+3851.5i$
980	6737	7717	$Z_1=1/2+980i$	$Z_2=1/2+6737i$	$Z'=1/2+3858.5i$
981	6742	7723	$Z_1=1/2+981i$	$Z_2=1/2+6742i$	$Z'=1/2+3861.5i$
982	6745	7727	$Z_1=1/2+982i$	$Z_2=1/2+6745i$	$Z'=1/2+3863.5i$
983	6758	7741	$Z_1=1/2+983i$	$Z_2=1/2+6758i$	$Z'=1/2+3870.5i$
984	6769	7753	$Z_1=1/2+984i$	$Z_2=1/2+6769i$	$Z'=1/2+3876.5i$
985	6772	7757	$Z_1=1/2+985i$	$Z_2=1/2+6772i$	$Z'=1/2+3878.5i$

986	6773	7759	$Z_1=1/2+986i$	$Z_2=1/2+6773i$	$Z'=1/2+3879.5i$
987	6802	7789	$Z_1=1/2+987i$	$Z_2=1/2+6802i$	$Z'=1/2+3894.5i$
988	6805	7793	$Z_1=1/2+988i$	$Z_2=1/2+6805i$	$Z'=1/2+3896.5i$
989	6828	7817	$Z_1=1/2+989i$	$Z_2=1/2+6828i$	$Z'=1/2+3908.5i$
990	6833	7823	$Z_1=1/2+990i$	$Z_2=1/2+6833i$	$Z'=1/2+3911.5i$
991	6838	7829	$Z_1=1/2+991i$	$Z_2=1/2+6838i$	$Z'=1/2+3914.5i$
992	6849	7841	$Z_1=1/2+992i$	$Z_2=1/2+6849i$	$Z'=1/2+3920.5i$
993	6860	7853	$Z_1=1/2+993i$	$Z_2=1/2+6860i$	$Z'=1/2+3926.5i$
994	6873	7867	$Z_1=1/2+994i$	$Z_2=1/2+6873i$	$Z'=1/2+3933.5i$
995	6878	7873	$Z_1=1/2+995i$	$Z_2=1/2+6878i$	$Z'=1/2+3936.5i$
996	6881	7877	$Z_1=1/2+996i$	$Z_2=1/2+6881i$	$Z'=1/2+3938.5i$
997	6882	7879	$Z_1=1/2+997i$	$Z_2=1/2+6882i$	$Z'=1/2+3939.5i$
998	6885	7883	$Z_1=1/2+998i$	$Z_2=1/2+6885i$	$Z'=1/2+3941.5i$
999	6902	7901	$Z_1=1/2+999i$	$Z_2=1/2+6902i$	$Z'=1/2+3950.5i$
1000	6907	7907	$Z_1=1/2+1000i$	$Z_2=1/2+6907i$	$Z'=1/2+3953.5i$
1001	6918	7919	$Z_1=1/2+1001i$	$Z_2=1/2+6918i$	$Z'=1/2+3959.5i$
1002	6925	7927	$Z_1=1/2+1002i$	$Z_2=1/2+6925i$	$Z'=1/2+3963.5i$
1003	6930	7933	$Z_1=1/2+1003i$	$Z_2=1/2+6930i$	$Z'=1/2+3966.5i$
1004	6933	7937	$Z_1=1/2+1004i$	$Z_2=1/2+6933i$	$Z'=1/2+3968.5i$
1005	6944	7949	$Z_1=1/2+1005i$	$Z_2=1/2+6944i$	$Z'=1/2+3974.5i$
1006	6945	7951	$Z_1=1/2+1006i$	$Z_2=1/2+6945i$	$Z'=1/2+3975.5i$
1007	6956	7963	$Z_1=1/2+1007i$	$Z_2=1/2+6956i$	$Z'=1/2+3981.5i$

1008	6985	7993	$Z_1=1/2+1008i$	$Z_2=1/2+6985i$	$Z'=1/2+3996.5i$
1009	7000	8009	$Z_1=1/2+1009i$	$Z_2=1/2+7000i$	$Z'=1/2+4004.5i$
1010	7001	8011	$Z_1=1/2+1010i$	$Z_2=1/2+7001i$	$Z'=1/2+4005.5i$
1011	7006	8017	$Z_1=1/2+1011i$	$Z_2=1/2+7006i$	$Z'=1/2+4008.5i$
1012	7027	8039	$Z_1=1/2+1012i$	$Z_2=1/2+7027i$	$Z'=1/2+4019.5i$
1013	7040	8053	$Z_1=1/2+1013i$	$Z_2=1/2+7040i$	$Z'=1/2+4026.5i$
1014	7045	8059	$Z_1=1/2+1014i$	$Z_2=1/2+7045i$	$Z'=1/2+4029.5i$
1015	7054	8069	$Z_1=1/2+1015i$	$Z_2=1/2+7054i$	$Z'=1/2+4034.5i$
1016	7065	8081	$Z_1=1/2+1016i$	$Z_2=1/2+7065i$	$Z'=1/2+4040.5i$
1017	7070	8087	$Z_1=1/2+1017i$	$Z_2=1/2+7070i$	$Z'=1/2+4043.5i$
1018	7071	8089	$Z_1=1/2+1018i$	$Z_2=1/2+7071i$	$Z'=1/2+4044.5i$
1019	7074	8093	$Z_1=1/2+1019i$	$Z_2=1/2+7074i$	$Z'=1/2+4046.5i$
1020	7081	8101	$Z_1=1/2+1020i$	$Z_2=1/2+7081i$	$Z'=1/2+4050.5i$
1021	7090	8111	$Z_1=1/2+1021i$	$Z_2=1/2+7090i$	$Z'=1/2+4055.5i$
1022	7095	8117	$Z_1=1/2+1022i$	$Z_2=1/2+7095i$	$Z'=1/2+4058.5i$
1023	7100	8123	$Z_1=1/2+1023i$	$Z_2=1/2+7100i$	$Z'=1/2+4061.5i$
1024	7123	8147	$Z_1=1/2+1024i$	$Z_2=1/2+7123i$	$Z'=1/2+4073.5i$
1025	7136	8161	$Z_1=1/2+1025i$	$Z_2=1/2+7136i$	$Z'=1/2+4080.5i$
1026	7141	8167	$Z_1=1/2+1026i$	$Z_2=1/2+7141i$	$Z'=1/2+4083.5i$
1027	7144	8171	$Z_1=1/2+1027i$	$Z_2=1/2+7144i$	$Z'=1/2+4085.5i$
1028	7151	8179	$Z_1=1/2+1028i$	$Z_2=1/2+7151i$	$Z'=1/2+4089.5i$
1029	7162	8191	$Z_1=1/2+1029i$	$Z_2=1/2+7162i$	$Z'=1/2+4095.5i$

1030	7179	8209	$Z_1=1/2+1030i$	$Z_2=1/2+7179i$	$Z'=1/2+4104.5i$
1031	7188	8219	$Z_1=1/2+1031i$	$Z_2=1/2+7188i$	$Z'=1/2+4109.5i$
1032	7189	8221	$Z_1=1/2+1032i$	$Z_2=1/2+7189i$	$Z'=1/2+4110.5i$
1033	7198	8231	$Z_1=1/2+1033i$	$Z_2=1/2+7198i$	$Z'=1/2+4115.5i$
1034	7199	8233	$Z_1=1/2+1034i$	$Z_2=1/2+7199i$	$Z'=1/2+4116.5i$
1035	7202	8237	$Z_1=1/2+1035i$	$Z_2=1/2+7202i$	$Z'=1/2+4118.5i$
1036	7207	8243	$Z_1=1/2+1036i$	$Z_2=1/2+7207i$	$Z'=1/2+4121.5i$
1037	7226	8263	$Z_1=1/2+1037i$	$Z_2=1/2+7226i$	$Z'=1/2+4131.5i$
1038	7231	8269	$Z_1=1/2+1038i$	$Z_2=1/2+7231i$	$Z'=1/2+4134.5i$
1039	7234	8273	$Z_1=1/2+1039i$	$Z_2=1/2+7234i$	$Z'=1/2+4136.5i$
1040	7247	8287	$Z_1=1/2+1040i$	$Z_2=1/2+7247i$	$Z'=1/2+4143.5i$
1041	7250	8291	$Z_1=1/2+1041i$	$Z_2=1/2+7250i$	$Z'=1/2+4145.5i$
1042	7251	8293	$Z_1=1/2+1042i$	$Z_2=1/2+7251i$	$Z'=1/2+4146.5i$
1043	7254	8297	$Z_1=1/2+1043i$	$Z_2=1/2+7254i$	$Z'=1/2+4148.5i$
1044	7267	8311	$Z_1=1/2+1044i$	$Z_2=1/2+7267i$	$Z'=1/2+4155.5i$
1045	7272	8317	$Z_1=1/2+1045i$	$Z_2=1/2+7272i$	$Z'=1/2+4158.5i$
1046	7283	8329	$Z_1=1/2+1046i$	$Z_2=1/2+7283i$	$Z'=1/2+4164.5i$
1047	7306	8353	$Z_1=1/2+1047i$	$Z_2=1/2+7306i$	$Z'=1/2+4176.5i$
1048	7315	8363	$Z_1=1/2+1048i$	$Z_2=1/2+7315i$	$Z'=1/2+4181.5i$
1049	7320	8369	$Z_1=1/2+1049i$	$Z_2=1/2+7320i$	$Z'=1/2+4184.5i$
1050	7327	8377	$Z_1=1/2+1050i$	$Z_2=1/2+7327i$	$Z'=1/2+4188.5i$
1051	7336	8387	$Z_1=1/2+1051i$	$Z_2=1/2+7336i$	$Z'=1/2+4193.5i$

1052	7337	8389	$Z_1=1/2+1052i$	$Z_2=1/2+7337i$	$Z'=1/2+4194.5i$
1053	7366	8419	$Z_1=1/2+1053i$	$Z_2=1/2+7366i$	$Z'=1/2+4209.5i$
1054	7369	8423	$Z_1=1/2+1054i$	$Z_2=1/2+7369i$	$Z'=1/2+4211.5i$
1055	7374	8429	$Z_1=1/2+1055i$	$Z_2=1/2+7374i$	$Z'=1/2+4214.5i$
1056	7375	8431	$Z_1=1/2+1056i$	$Z_2=1/2+7375i$	$Z'=1/2+4215.5i$
1057	7386	8443	$Z_1=1/2+1057i$	$Z_2=1/2+7386i$	$Z'=1/2+8221.5i$
1058	7389	8447	$Z_1=1/2+1058i$	$Z_2=1/2+7389i$	$Z'=1/2+4223.5i$
1059	7402	8461	$Z_1=1/2+1059i$	$Z_2=1/2+7402i$	$Z'=1/2+4230.5i$
1060	7407	8467	$Z_1=1/2+1060i$	$Z_2=1/2+7407i$	$Z'=1/2+4233.5i$
1061	7440	8501	$Z_1=1/2+1061i$	$Z_2=1/2+7440i$	$Z'=1/2+4250.5i$
1062	7451	8513	$Z_1=1/2+1062i$	$Z_2=1/2+7451i$	$Z'=1/2+4256.5i$
1063	7458	8521	$Z_1=1/2+1063i$	$Z_2=1/2+7458i$	$Z'=1/2+4260.5i$
1064	7463	8527	$Z_1=1/2+1064i$	$Z_2=1/2+7463i$	$Z'=1/2+4263.5i$
1065	7472	8537	$Z_1=1/2+1065i$	$Z_2=1/2+7472i$	$Z'=1/2+4268.5i$
1066	7473	8539	$Z_1=1/2+1066i$	$Z_2=1/2+7473i$	$Z'=1/2+4269.5i$
1067	7476	8543	$Z_1=1/2+1067i$	$Z_2=1/2+7476i$	$Z'=1/2+4271.5i$
1068	7495	8563	$Z_1=1/2+1068i$	$Z_2=1/2+7495i$	$Z'=1/2+4281.5i$
1069	7504	8573	$Z_1=1/2+1069i$	$Z_2=1/2+7504i$	$Z'=1/2+4286.5i$
1070	7511	8581	$Z_1=1/2+1070i$	$Z_2=1/2+7511i$	$Z'=1/2+4290.5i$
1071	7526	8597	$Z_1=1/2+1071i$	$Z_2=1/2+7526i$	$Z'=1/2+4298.5i$
1072	7527	8599	$Z_1=1/2+1072i$	$Z_2=1/2+7527i$	$Z'=1/2+4299.5i$
1073	7536	8609	$Z_1=1/2+1073i$	$Z_2=1/2+7536i$	$Z'=1/2+4304.5i$

1074	7549	8623	$Z_1=1/2+1074i$	$Z_2=1/2+7549i$	$Z'=1/2+4311.5i$
1075	7552	8627	$Z_1=1/2+1075i$	$Z_2=1/2+7552i$	$Z'=1/2+4313.5i$
1076	7553	8629	$Z_1=1/2+1076i$	$Z_2=1/2+7553i$	$Z'=1/2+4314.5i$
1077	7564	8641	$Z_1=1/2+1077i$	$Z_2=1/2+7564i$	$Z'=1/2+4320.5i$
1078	7569	8647	$Z_1=1/2+1078i$	$Z_2=1/2+7569i$	$Z'=1/2+4323.5i$
1079	7584	8663	$Z_1=1/2+1079i$	$Z_2=1/2+7584i$	$Z'=1/2+4331.5i$
1080	7589	8669	$Z_1=1/2+1080i$	$Z_2=1/2+7589i$	$Z'=1/2+4334.5i$
1081	7596	8677	$Z_1=1/2+1081i$	$Z_2=1/2+7596i$	$Z'=1/2+4338.5i$
1082	7599	8681	$Z_1=1/2+1082i$	$Z_2=1/2+7599i$	$Z'=1/2+4340.5i$
1083	7606	8689	$Z_1=1/2+1083i$	$Z_2=1/2+7606i$	$Z'=1/2+4344.5i$
1084	7609	8693	$Z_1=1/2+1084i$	$Z_2=1/2+7609i$	$Z'=1/2+4346.5i$
1085	7614	8699	$Z_1=1/2+1085i$	$Z_2=1/2+7614i$	$Z'=1/2+4349.5i$
1086	7621	8707	$Z_1=1/2+1086i$	$Z_2=1/2+7621i$	$Z'=1/2+43503.5i$
1087	7626	8713	$Z_1=1/2+1087i$	$Z_2=1/2+7626i$	$Z'=1/2+4356.5i$
1088	7631	8719	$Z_1=1/2+1088i$	$Z_2=1/2+7631i$	$Z'=1/2+4359.5i$
1089	7642	8731	$Z_1=1/2+1089i$	$Z_2=1/2+7642i$	$Z'=1/2+4365.5i$
1090	7647	8737	$Z_1=1/2+1090i$	$Z_2=1/2+7647i$	$Z'=1/2+4368.5i$
1091	7650	8741	$Z_1=1/2+1091i$	$Z_2=1/2+7650i$	$Z'=1/2+4370.5i$
1092	7655	8747	$Z_1=1/2+1092i$	$Z_2=1/2+7655i$	$Z'=1/2+4373.5i$
1093	7660	8753	$Z_1=1/2+1093i$	$Z_2=1/2+7660i$	$Z'=1/2+4376.5i$
1094	7667	8761	$Z_1=1/2+1094i$	$Z_2=1/2+7667i$	$Z'=1/2+4380.5i$
1095	7684	8779	$Z_1=1/2+1095i$	$Z_2=1/2+7684i$	$Z'=1/2+4389.5i$

1096	7687	8783	$Z_1=1/2+1096i$	$Z_2=1/2+7687i$	$Z'=1/2+4391.5i$
1097	7706	8803	$Z_1=1/2+1097i$	$Z_2=1/2+7706i$	$Z'=1/2+4401.5i$
1098	7709	8807	$Z_1=1/2+1098i$	$Z_2=1/2+7709i$	$Z'=1/2+4403.5i$
1099	7720	8819	$Z_1=1/2+1099i$	$Z_2=1/2+7720i$	$Z'=1/2+8809.5i$
1100	7721	8821	$Z_1=1/2+1100i$	$Z_2=1/2+7721i$	$Z'=1/2+4410.5i$
1101	7730	8831	$Z_1=1/2+1101i$	$Z_2=1/2+7730i$	$Z'=1/2+4415.5i$
1102	7735	8837	$Z_1=1/2+1102i$	$Z_2=1/2+7735i$	$Z'=1/2+4418.5i$
1103	7736	8839	$Z_1=1/2+1103i$	$Z_2=1/2+7736i$	$Z'=1/2+4419.5i$
1104	7745	8849	$Z_1=1/2+1104i$	$Z_2=1/2+7745i$	$Z'=1/2+4424.5i$
1105	7756	8861	$Z_1=1/2+1105i$	$Z_2=1/2+7756i$	$Z'=1/2+4430.5i$
1106	7757	8863	$Z_1=1/2+1106i$	$Z_2=1/2+7757i$	$Z'=1/2+4431.5i$
1107	7760	8867	$Z_1=1/2+1107i$	$Z_2=1/2+7760i$	$Z'=1/2+4433.5i$
1108	7779	8887	$Z_1=1/2+1108i$	$Z_2=1/2+7779i$	$Z'=1/2+4443.5i$
1109	7784	8893	$Z_1=1/2+1109i$	$Z_2=1/2+7784i$	$Z'=1/2+4446.5i$
1110	7813	8923	$Z_1=1/2+1110i$	$Z_2=1/2+7813i$	$Z'=1/2+44461.5i$
1111	7818	8929	$Z_1=1/2+1111i$	$Z_2=1/2+7818i$	$Z'=1/2+4464.5i$
1112	7821	8933	$Z_1=1/2+111i$	$Z_2=1/2+7821i$	$Z'=1/2+4466.5i$
1113	7828	8941	$Z_1=1/2+1113i$	$Z_2=1/2+7828i$	$Z'=1/2+4470.5i$
1114	7837	8951	$Z_1=1/2+1114i$	$Z_2=1/2+7837i$	$Z'=1/2+4475.5i$
1115	7848	8963	$Z_1=1/2+1115i$	$Z_2=1/2+7848i$	$Z'=1/2+4481.5i$
1116	7853	8969	$Z_1=1/2+1116i$	$Z_2=1/2+7853i$	$Z'=1/2+4484.5i$
1117	7854	8971	$Z_1=1/2+1117i$	$Z_2=1/2+7854i$	$Z'=1/2+4485.5i$

1118	7881	8999	$Z_1=1/2+1118i$	$Z_2=1/2+7881i$	$Z'=1/2+4499.5i$
1119	7882	9001	$Z_1=1/2+1119i$	$Z_2=1/2+7882i$	$Z'=1/2+4500.5i$
1120	7887	9007	$Z_1=1/2+1120i$	$Z_2=1/2+7887i$	$Z'=1/2+4503.5i$
1121	7890	9011	$Z_1=1/2+1121i$	$Z_2=1/2+7890i$	$Z'=1/2+4505.5i$
1122	7891	9013	$Z_1=1/2+1122i$	$Z_2=1/2+7891i$	$Z'=1/2+4506.5i$
1123	7906	9029	$Z_1=1/2+1123i$	$Z_2=1/2+7906i$	$Z'=1/2+4514.5i$
1124	7917	9041	$Z_1=1/2+1124i$	$Z_2=1/2+7917i$	$Z'=1/2+4520.5i$
1125	7918	9043	$Z_1=1/2+1125i$	$Z_2=1/2+7918i$	$Z'=1/2+4521.5i$
1126	7923	9049	$Z_1=1/2+1126i$	$Z_2=1/2+7923i$	$Z'=1/2+4524.5i$
1127	7932	9059	$Z_1=1/2+1127i$	$Z_2=1/2+7932i$	$Z'=1/2+4529.5i$
1128	7939	9067	$Z_1=1/2+1128i$	$Z_2=1/2+7939i$	$Z'=1/2+4533.5i$
1129	7962	9091	$Z_1=1/2+1129i$	$Z_2=1/2+7962i$	$Z'=1/2+4545.5i$
1130	7973	9103	$Z_1=1/2+1130i$	$Z_2=1/2+7973i$	$Z'=1/2+4551.5i$
1131	7978	9109	$Z_1=1/2+1131i$	$Z_2=1/2+7978i$	$Z'=1/2+4554.5i$
1132	7995	9127	$Z_1=1/2+1132i$	$Z_2=1/2+7995i$	$Z'=1/2+4563.5i$
1133	8000	9133	$Z_1=1/2+1133i$	$Z_2=1/2+8000i$	$Z'=1/2+4566.5i$
1134	8003	9137	$Z_1=1/2+1134i$	$Z_2=1/2+8003i$	$Z'=1/2+4568.5i$
1135	8016	9151	$Z_1=1/2+1135i$	$Z_2=1/2+8016i$	$Z'=1/2+4575.5i$
1136	8021	9157	$Z_1=1/2+1136i$	$Z_2=1/2+8021i$	$Z'=1/2+4578.5i$
1137	8024	9161	$Z_1=1/2+1137i$	$Z_2=1/2+8024i$	$Z'=1/2+4580.5i$
1138	8035	9173	$Z_1=1/2+1138i$	$Z_2=1/2+8035i$	$Z'=1/2+4586.5i$
1139	8042	9181	$Z_1=1/2+1139i$	$Z_2=1/2+8042i$	$Z'=1/2+4590.5i$

1140	8047	9187	$Z_1=1/2+1140i$	$Z_2=1/2+8047i$	$Z'=1/2+4593.5i$
1141	8058	9199	$Z_1=1/2+1141i$	$Z_2=1/2+8058i$	$Z'=1/2+4599.5i$
1142	8061	9203	$Z_1=1/2+1142i$	$Z_2=1/2+8061i$	$Z'=1/2+4601.5i$
1143	8066	9209	$Z_1=1/2+1143i$	$Z_2=1/2+8066i$	$Z'=1/2+4604.5i$
1144	8077	9221	$Z_1=1/2+1144i$	$Z_2=1/2+8077i$	$Z'=1/2+4610.5i$
1145	8082	9227	$Z_1=1/2+1145i$	$Z_2=1/2+8082i$	$Z'=1/2+4613.5i$
1146	8093	9239	$Z_1=1/2+1146i$	$Z_2=1/2+8093i$	$Z'=1/2+4619.5i$
1147	8094	9241	$Z_1=1/2+1147i$	$Z_2=1/2+8094i$	$Z'=1/2+4620.5i$
1148	8109	9257	$Z_1=1/2+1148i$	$Z_2=1/2+8109i$	$Z'=1/2+4628.5i$
1149	8128	9277	$Z_1=1/2+1149i$	$Z_2=1/2+8128i$	$Z'=1/2+4638.5i$
1150	8131	9281	$Z_1=1/2+1150i$	$Z_2=1/2+8131i$	$Z'=1/2+4640.5i$
1151	8132	9283	$Z_1=1/2+1151i$	$Z_2=1/2+8132i$	$Z'=1/2+4641.5i$
1152	8141	9293	$Z_1=1/2+1152i$	$Z_2=1/2+8141i$	$Z'=1/2+4646.5i$
1153	8158	9311	$Z_1=1/2+1153i$	$Z_2=1/2+8158i$	$Z'=1/2+4655.5i$
1154	8165	9319	$Z_1=1/2+1154i$	$Z_2=1/2+8165i$	$Z'=1/2+4659.5i$
1155	8168	9323	$Z_1=1/2+1155i$	$Z_2=1/2+8168i$	$Z'=1/2+4661.5i$
1156	8181	9337	$Z_1=1/2+1156i$	$Z_2=1/2+8181i$	$Z'=1/2+4668.5i$
1157	8184	9341	$Z_1=1/2+1157i$	$Z_2=1/2+8184i$	$Z'=1/2+4670.5i$
1158	8185	9343	$Z_1=1/2+1158i$	$Z_2=1/2+8185i$	$Z'=1/2+4671.5i$
1159	8190	9349	$Z_1=1/2+1159i$	$Z_2=1/2+8190i$	$Z'=1/2+4674.5i$
1160	8211	9371	$Z_1=1/2+1160i$	$Z_2=1/2+8211i$	$Z'=1/2+4685.5i$
1161	8216	9377	$Z_1=1/2+1161i$	$Z_2=1/2+8216i$	$Z'=1/2+4688.5i$

1162	8229	9391	Z_1=1/2+1162i	Z_2=1/2+8229i	Z'=1/2+4695.5i
1163	8234	9397	Z_1=1/2+1163i	Z_2=1/2+8234i	Z'=1/2+4698.5i
1164	8239	9403	Z_1=1/2+1164i	Z_2=1/2+8239i	Z'=1/2+4701.5i
1165	8248	9413	Z_1=1/2+1165i	Z_2=1/2+8248i	Z'=1/2+4706.5i
1166	8253	9419	Z_1=1/2+1166i	Z_2=1/2+8253i	Z'=1/2+4709.5i
1167	8254	9421	Z_1=1/2+1167i	Z_2=1/2+8254i	Z'=1/2+4710.5i
1168	8263	9431	Z_1=1/2+1168i	Z_2=1/2+8263i	Z'=1/2+4715.5i
1169	8264	9433	Z_1=1/2+1169i	Z_2=1/2+8264i	Z'=1/2+4716.5i
1170	8267	9437	Z_1=1/2+1170i	Z_2=1/2+8267i	Z'=1/2+4718.5i
1171	8268	9439	Z_1=1/2+1171i	Z_2=1/2+8268i	Z'=1/2+4719.5i
1172	8289	9461	Z_1=1/2+1172i	Z_2=1/2+8289i	Z'=1/2+4730.5i
1173	8290	9463	Z_1=1/2+1173i	Z_2=1/2+8290i	Z'=1/2+4736.5i
1174	8293	9467	Z_1=1/2+1174i	Z_2=1/2+8293i	Z'=1/2+4733.5i
1175	8298	9473	Z_1=1/2+1175i	Z_2=1/2+8298i	Z'=1/2+4736.5i
1176	8303	9479	Z_1=1/2+1176i	Z_2=1/2+8303i	Z'=1/2+4739.5i
1177	8314	9491	Z_1=1/2+1177i	Z_2=1/2+8314i	Z'=1/2+4745.5i
1178	8319	9497	Z_1=1/2+1178i	Z_2=1/2+8319i	Z'=1/2+4748.5i
1179	8332	9511	Z_1=1/2+1179i	Z_2=1/2+8332i	Z'=1/2+4755.5i
1180	8341	9521	Z_1=1/2+1180i	Z_2=1/2+8341i	Z'=1/2+4760.5i
1181	8352	9533	Z_1=1/2+1181i	Z_2=1/2+8352i	Z'=1/2+4766.5i
1182	8357	9539	Z_1=1/2+1182i	Z_2=1/2+8357i	Z'=1/2+4769.5i
1183	8364	9547	Z_1=1/2+1183i	Z_2=1/2+8364i	Z'=1/2+4773.5i

1184	8367	9551	Z_1＝1/2＋1184i	Z_2＝1/2＋8367i	Z'＝1/2＋4775.5i
1185	8402	9587	Z_1＝1/2＋1185i	Z_2＝1/2＋8402i	Z'＝1/2＋4793.5i
1186	8415	9601	Z_1＝1/2＋1186i	Z_2＝1/2＋8415i	Z'＝1/2＋4800.5i
1187	8426	9613	Z_1＝1/2＋1187i	Z_2＝1/2＋8426i	Z'＝1/2＋4806.5i
1188	8431	9619	Z_1＝1/2＋1188i	Z_2＝1/2＋8431i	Z'＝1/2＋4809.5i
1189	8434	9623	Z_1＝1/2＋1189i	Z_2＝1/2＋8434i	Z'＝1/2＋4811.5i
1190	8439	9629	Z_1＝1/2＋1190i	Z_2＝1/2＋8439i	Z'＝1/2＋4814.5i
1191	8440	9631	Z_1＝1/2＋191i	Z_2＝1/2＋8440i	Z'＝1/2＋4815.5i
1192	8451	9643	Z_1＝1/2＋1192i	Z_2＝1/2＋8451i	Z'＝1/2＋4821.5i
1193	8456	9649	Z_1＝1/2＋1193i	Z_2＝1/2＋8456i	Z'＝1/2＋4824.5i
1194	8467	9661	Z_1＝1/2＋1194i	Z_2＝1/2＋8467i	Z'＝1/2＋4830.5i
1195	8482	9677	Z_1＝1/2＋1195i	Z_2＝1/2＋8482i	Z'＝1/2＋4838.5i
1196	8483	9679	Z_1＝1/2＋1196i	Z_2＝1/2＋8483i	Z'＝1/2＋4839.5i
1197	8492	9689	Z_1＝1/2＋1197i	Z_2＝1/2＋8492i	Z'＝1/2＋4844.5i
1198	8499	9697	Z_1＝1/2＋1198i	Z_2＝1/2＋8499i	Z'＝1/2＋4848.5i
1199	8520	9719	Z_1＝1/2＋1199i	Z_2＝1/2＋8520i	Z'＝1/2＋4859.5i
1200	8521	9721	Z_1＝1/2＋1200i	Z_2＝1/2＋8521i	Z'＝1/2＋4860.5i
1201	8532	9733	Z_1＝1/2＋1201i	Z_2＝1/2＋8532i	Z'＝1/2＋4866.5i
1202	8537	9739	Z_1＝1/2＋1202i	Z_2＝1/2＋8537i	Z'＝1/2＋4869.5i
1203	8540	9743	Z_1＝1/2＋1203i	Z_2＝1/2＋8540i	Z'＝1/2＋4871.5i
1204	8545	9749	Z_1＝1/2＋1204i	Z_2＝1/2＋8545i	Z'＝1/2＋4874.5i
1205	8562	9767	Z_1＝1/2＋1205i	Z_2＝1/2＋8562i	Z'＝1/2＋4883.5i

1206	8563	9769	$Z_1=1/2+1206i$	$Z_2=1/2+8563i$	$Z'=1/2+4884.5i$
1207	8574	9781	$Z_1=1/2+1207i$	$Z_2=1/2+8574i$	$Z'=1/2+4890.5i$
1208	8579	9787	$Z_1=1/2+1208i$	$Z_2=1/2+8579i$	$Z'=1/2+4893.5i$
1209	8582	9791	$Z_1=1/2+1209i$	$Z_2=1/2+8582i$	$Z'=1/2+4895.5i$
1210	8593	9803	$Z_1=1/2+1210i$	$Z_2=1/2+8593i$	$Z'=1/2+4901.5i$
1211	8600	9811	$Z_1=1/2+1211i$	$Z_2=1/2+8600i$	$Z'=1/2+4905.5i$
1212	8605	9817	$Z_1=1/2+1212i$	$Z_2=1/2+8605i$	$Z'=1/2+4908.5i$
1213	8616	9829	$Z_1=1/2+1213i$	$Z_2=1/2+8616i$	$Z'=1/2+4914.5i$
1214	8619	9833	$Z_1=1/2+1214i$	$Z_2=1/2+8619i$	$Z'=1/2+4916.5i$
1215	8624	9839	$Z_1=1/2+1215i$	$Z_2=1/2+8624i$	$Z'=1/2+4919.5i$
1216	8635	9851	$Z_1=1/2+1216i$	$Z_2=1/2+8635i$	$Z'=1/2+4925.5i$
1217	8640	9857	$Z_1=1/2+1217i$	$Z_2=1/2+8640i$	$Z'=1/2+4928.5i$
1218	8641	9859	$Z_1=1/2+1218i$	$Z_2=1/2+8641i$	$Z'=1/2+4929.5i$
1219	8652	9871	$Z_1=1/2+1219i$	$Z_2=1/2+8652i$	$Z'=1/2+4935.5i$
1220	8663	9883	$Z_1=1/2+1220i$	$Z_2=1/2+8663i$	$Z'=1/2+4941.5i$
1221	8666	9887	$Z_1=1/2+1221i$	$Z_2=1/2+8666i$	$Z'=1/2+4943.5i$
1222	8679	9901	$Z_1=1/2+1222i$	$Z_2=1/2+8679i$	$Z'=1/2+4950.5i$
1223	8684	9907	$Z_1=1/2+1223i$	$Z_2=1/2+8684i$	$Z'=1/2+4953.5i$
1224	8699	9923	$Z_1=1/2+1224i$	$Z_2=1/2+8699i$	$Z'=1/2+4961.5i$
1225	8704	9929	$Z_1=1/2+1225i$	$Z_2=1/2+8704i$	$Z'=1/2+4964.5i$
1226	8705	9931	$Z_1=1/2+1226i$	$Z_2=1/2+8705i$	$Z'=1/2+4965.5i$
1227	8714	9941	$Z_1=1/2+1227i$	$Z_2=1/2+8714i$	$Z'=1/2+4970.5i$

1228	8721	9949	$Z_1=1/2+1228i$	$Z_2=1/2+8721i$	$Z'=1/2+4974.5i$
1229	8738	9967	$Z_1=1/2+1229i$	$Z_2=1/2+8738i$	$Z'=1/2+4983.5i$
1230	8743	9973	$Z_1=1/2+1230i$	$Z_2=1/2+8743i$	$Z'=1/2+4986.5i$
…	…	…	…	…	…
∞	∞	∞	∞	∞	∞

注 1. 非平凡零点复数Z_1、Z_2的实部是 1/2，而虚部分别是有序素数P_m的序数 m 和前 m 项合数个数的和S_m，则 m 和S_m必然是正整数。

Note 1: The real part of the nontrivial zeros complex Z_1、Z_2 is 1/2, and the imaginary part is the sum of the ordinal m of the ordered prime P_m and the composite number S_m of the preceding m terms, then m and S_m must be positive integers.

注 2. 因为 m，S_m分别是有序素数P_m的序数 m 和前 m 项的合数个数和，则表中必有P_m为：

Note 2. Since m, S_m are the sum of the ordinal m and the composite number of the preceding m terms of the ordered prime P_m, the table must have P_m as:

$$P_m = m + S_m \equiv 1 (\mathrm{mod} 2).$$

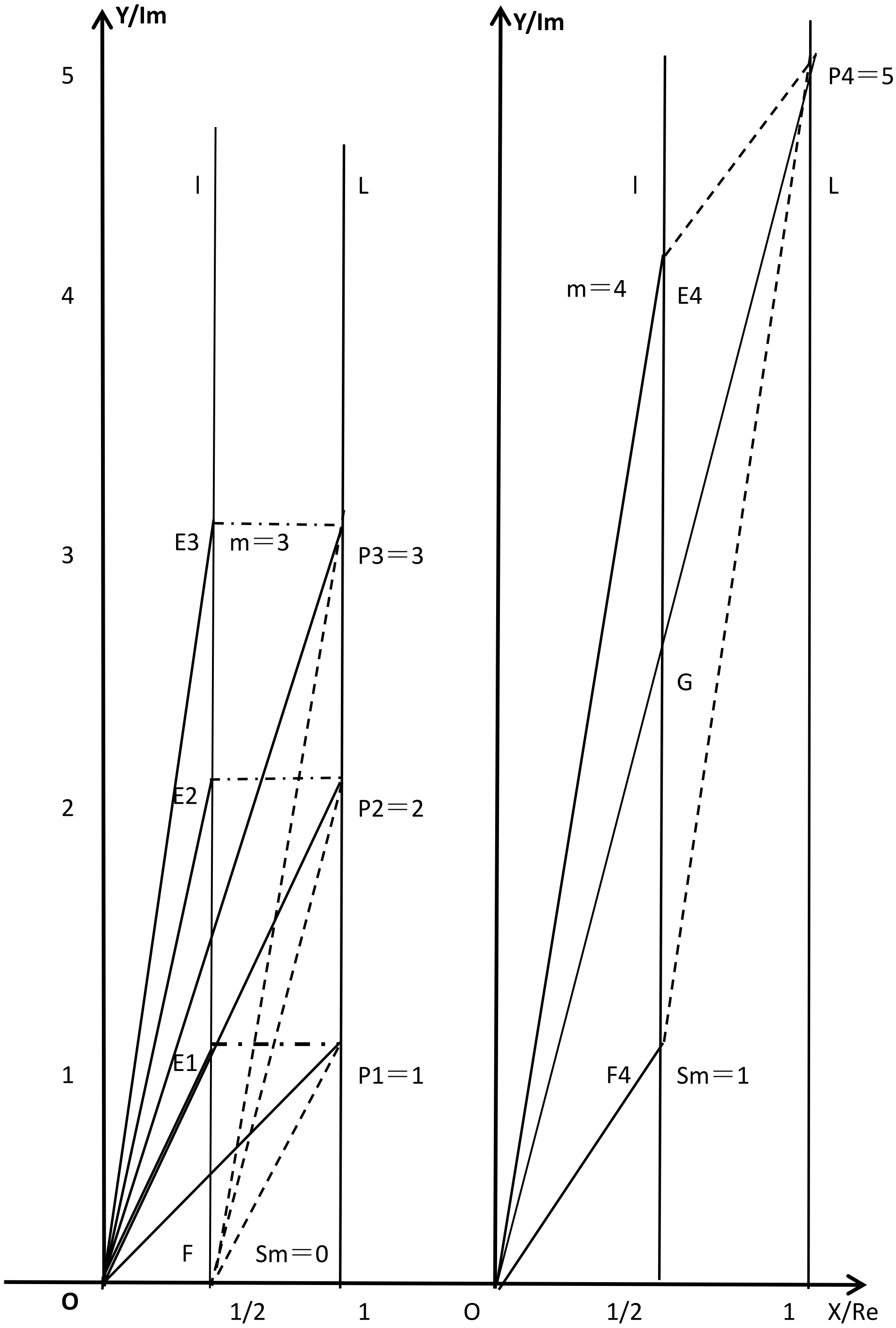

Figure 18. Schematic diagram of parallelogram decomposition of prime numbers 1,2,3 and 5.

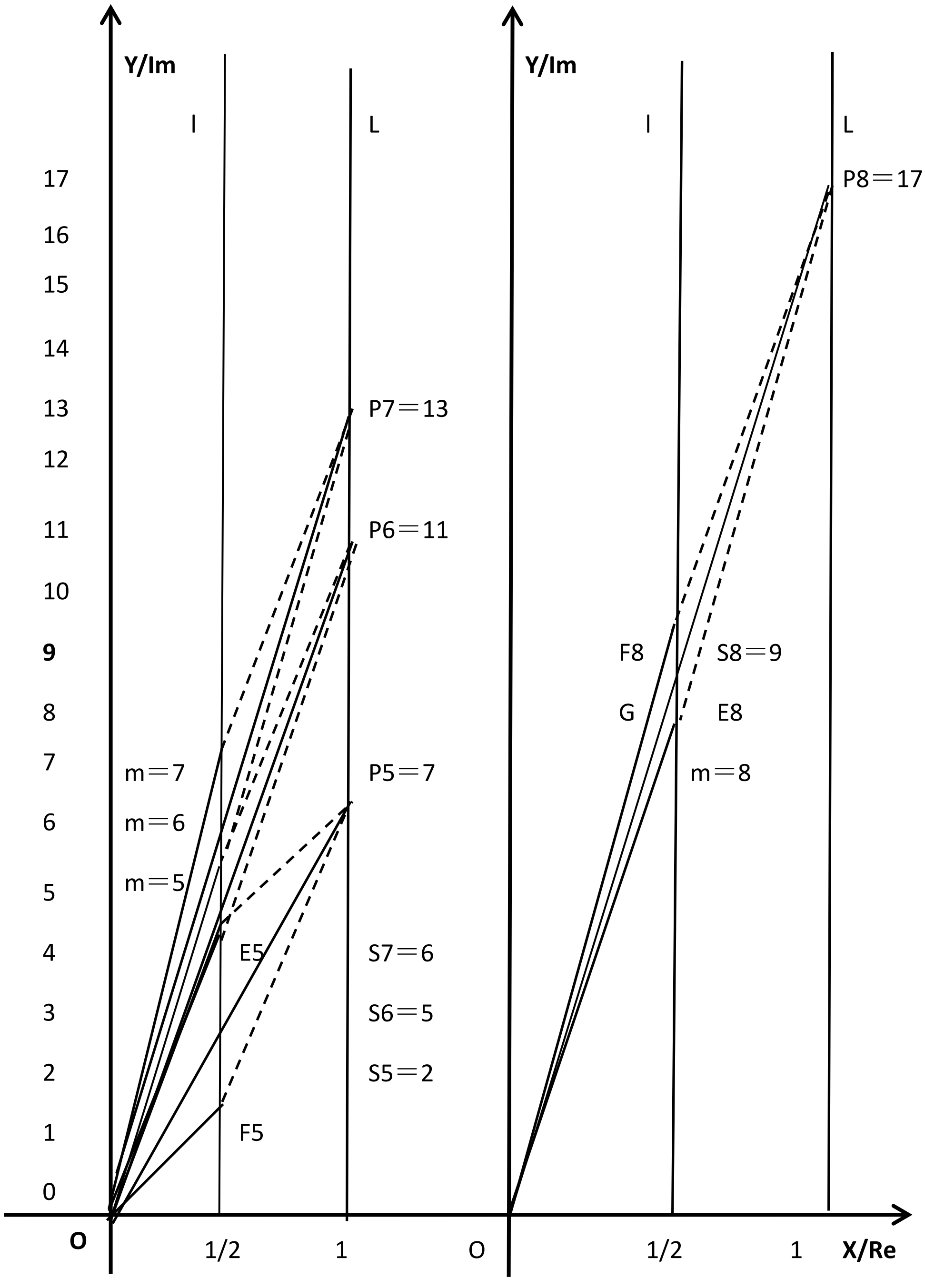

Figure 19. Schematic diagram of parallelogram decomposition of prime numbers 7,11,13 and 17

(完 End)