GROWTH PRIMES

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The growth of prime numbers was a clear indication. Increase – the number increases, the addition of something. If the number of prime numbers, figuratively called the «ladder of Gauss-Riemann», the increase may well be likened to the steps, separated from the ladder itself. We prove that the law is obeyed $z_2(i_2 = 2) = 1/2 - 1/2\cos(\pi p(n)/2)$ in the critical line $i_2 = 2$ of the second digit binary number system. This functional model was stable and in other quantities of prime numbers (3000 and 100 000). The critical line is the Riemann column $i_2 = 2$ binary matrix of a prime rate. Not all non-trivial zeros lie on it. There is also a line of frames, the initial rate (yields patterns of symmetry) and left the envelope binary number 1. Cryptographers cannot worry: even on the critical line growth of prime numbers $z_{2j} = 1/2 - 1/2\cos(\pi p_j/2)$ contain the irrational number $\pi = 3{,}14159$ ...

Keywords: prime numbers, increase, the critical line, the root of 1/2

Gauss, Riemann, and behind them and other mathematicians carried away by the relative power $x/\pi(x)$ of prime numbers with a truncated start, represented in dotted decimal notation. In this case, apparently unconsciously, this figure has been expressed with the logarithm of the irrational basis $e = 2{,}71$ ..., and thus the transition from ten degrees to its natural logarithm of false identification has occurred. It is the main error of more than 150 years.

We refused to logarithms, went to the binary system. It turned out that the very prime, $a(n) = \{2, 3, 5, 7, 11, 13, 17, ...\}$, $n = \{1, 2, 3\}$ is not sufficiently effective measure. To avoid any claims to the proof, we adopt this traditional range.

Algorithm building a number of prime numbers. He is widely known, has the form

$$a(n+1) = a(n) + p(n), \qquad (1)$$

where $p(n)$ – the growth of a prime number; n – the order of (number) of a prime number. The very number of primes is given initially, it is determined by the condition of the indivisibility of the other numbers, except on unit and itself (the latter condition, even excessive).

Therefore, growth is always calculated by subtracting

$$p(n) = a(n+1) - a(n). \qquad (2)$$

In table 1 shows fragments of the growth of a number of $a(n) = \{2, 3, 5, ..., 3571\}$.

Among the 500 prime numbers was a maximum increase $p(217) = 34$ for a prime $a(217) = 1327$ with code 100010 in binary.

The fundamental difference of a number of growth of the number of primes is that in the growth (the same number – an abstract measure of the amount), only one column $i_2 = 2$ bit binary numbers is completely filled and critical, and the first class has only zeros for the set $a(n) > 2$.

Full filling will continue to infinity, therefore, can be considered a proven fact the appearance of the $p(n) = 2$ at any power $a(n)$.

Mathematical landscape. To construct (fig. 1) we take the example $i_2 = 1, 2, 3, 4, 5$ and delete those rows in which the five columns contains at least one trivial zero.

Table 1

A number of primes increase in 10th and binary number systems

Order n prime	Prime $a(n)$	The growth $p(n)$ of a prime	The category of number i_2 of binary system: 6	5	4	3	2	1
			Part of the increase $p_{i_2}(n) = 2^{i_2-1}$: 32	16	8	4	2	1
1	2	1						1
2	3	2	trivial zeros				1	0
3	5	2					1	0
4	7	4				1	0	0
5	11	2					1	0
...	...	...	...	...	...	...	...	...
495	3539	2					1	0
496	3541	6				1	1	0
497	3547	10			1	0	1	0
498	3557	2					1	0
499	3559	12			1	1	0	0

An indicator is a binary number z_2 in the field of real numbers (0, 1).

Critical line. The first line in table 1 will automatically fall out of the set. After that, at any length series of prime numbers the first column $i_2 = 1$ is zero. Then each value increment from right to left starting from zero and ends with the unit. And for the unit as a wave broken lines are only trivial zeros.

All non-trivial zeros are arranged in any row between 1 (left) and 0 (first column on the right). Then ***Riemann's critical line*** in a vertical column $i_2 = 2$. But it is clear that not all non-trivial zeros lie on the critical line. They are available in other binary digits, interspersed with trivial zeros.

Critical start of the series. In table 2 shows the three critical primes.

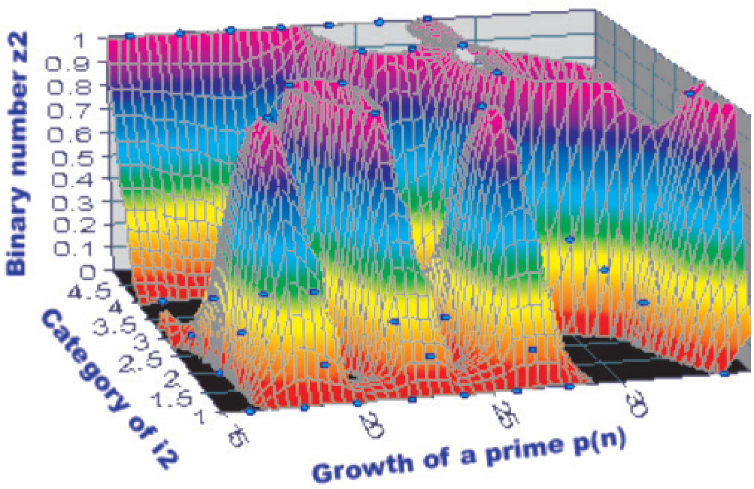


Fig. 1. The landscape of growth in the number of 500 prime numbers

Table 2

Gain critical primes

Order n	Prime $a(n)$	Growth $p(n)$	Digit number i_2					
			6	5	4	3	2	1
			part of the increase					
			32	16	8	4	2	1
-1	0	1						
0	1	1	trivial zeros					1
1	2	1						1

Together with table 1 critical prime numbers give a full range of prime numbers, which this article is not considered. To accept it, you must:

a) to recognize as simple that number which shares only on unit (zero/zero indefinite);

b) change the order in a number $N = \{0, 1, 2, 3, 4, ...\}$;

c) gain 1 is a border in the uncritical range includes non-critical prime $P = \{3, 5, 7, ...\}$.

Further detailed analysis of the growth will fulfill a number of non-critical primes.

Effect of discharge i_2. In the software environment of Excel sum over the columns in table 1 (excluding the first line) and get the number of units $\sum z_2$ in the ranks of the binary system.

Table 3

Influence of discharge binary system (498 lines)

i_2	p_{i_2}	$\sum z_2$	Share 1	$\sum(z_2=0)$	Share 0	$2^{i_2-1}\sum z_2$	$\sum z_2/\sum\sum z_2$
1	1	0	0	498	1	0	0
2	2	298	0,5984	200	0,4016	596	0,3855
3	4	285	0,5723	213	0,4277	1140	0,3687
	8	153	0,3072	345	0,6928	1224	0,1979
5	16	36	0,0723	462	0,9277	576	0,0466
6	32	1	0,0020	497	0,9980	32	0,0013
All		773	-	2215	-	3568	-

Model should give the relative values that allow comparison between different series of growth of prime numbers.

After the identification of bio-law [2] was to teach the following conclusions:

– the share of units (fig. 2) lines of the binary matrix of growth of prime numbers

$$\nu(1) = \frac{\sum z_2}{498} = 0{,}61623(i_2-1)^{0{,}28783}\exp(-0{,}029314(i_2-1)^{3{,}22295}). \quad (3)$$

– the proportion of zeros in (fig. 2) lines of the binary matrix of growth of prime numbers

$$\nu(0) = \frac{498-\sum z_2}{498} = 1-0{,}61623(i_2-1)^{0{,}28783}\exp(-0{,}029314(i_2-1)^{3{,}22295}). \quad (4)$$

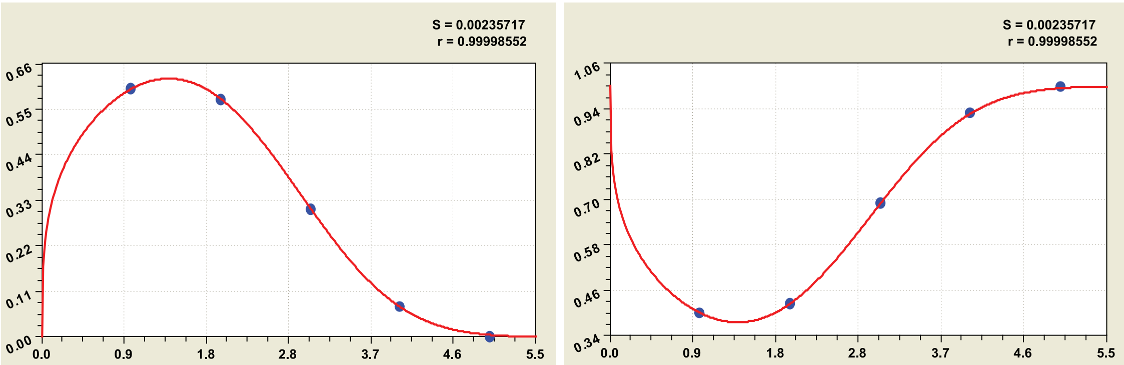


Fig. 2. Share units (left) and zero (right) in the rows of the matrix: – dispersion; – correlation coefficient

In favor of computing the number of units, there are two distinctive features:

1) the number of zeros (trivial and nontrivial) is almost three times as many units (table 3);

2) the design of the formula (2) is easier compared with the expression (3).

Apparently, the option is 0,61623 with increasing number of $n \to \infty$ will approach to the golden ratio 0,618 .... Then, on the critical line are $\varphi^{-1} = 0{,}618...$ ones and 0,6182 zeros.

Contribution amounts for units of columns (fig. 3) to the total (table 3 773) will be equal

$$\frac{\sum z_2}{\sum\sum z_2} = 0{,}39902(i_2 - 1)^{0{,}32247} \exp(-0{,}034914(i_2 - 1)^{3{,}09819}). \qquad (5)$$

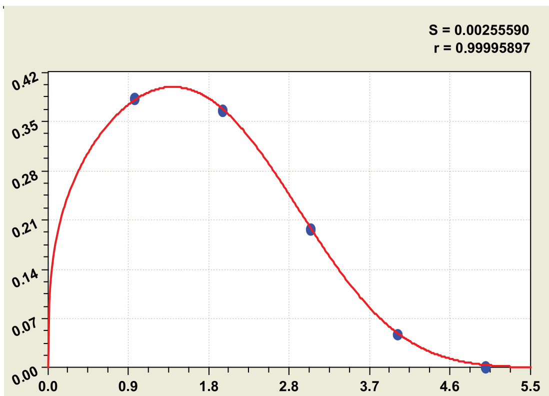


Fig. 3. Schedule the amount of the contribution of units in the columns of table 1

On the critical line $i_2 = 2$ contribution approaching to the square of the golden section.

Influence of growth. The explanatory variable we take the increase of a prime number. Then on the different digits of the binary number system formed their statistical model (tab. 4) type

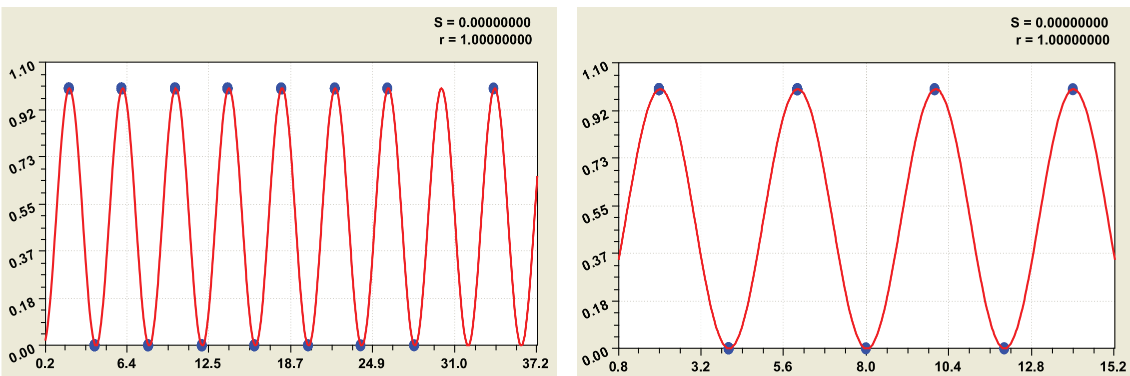
$$z_2 = a_1 - a_2 \cos\left(\frac{\pi p(n)}{a_3 + a_4 p(n)^{a_5}} - a_6\right), \qquad (6)$$

where $a_1 ... a_6$ – the parameters of the model (6).

If we ignore the first and last bits binary system, the closest to a rational number 1/2 on real values is the discharge $i_2 = 2$.

For the critical line $i_2 = 2$ (6) is reduced (fig. 4) to the form

$$z_2(i_2 = 2) = \frac{1}{2} - \frac{1}{2} 2\cos\left(\frac{\pi p(n)}{2}\right). \qquad (7)$$



A number of prime numbers 500 A number of prime numbers A000040

Fig. 4. Graphics (6) to prove the Riemann Hypothesis: S – dispersion; r – correlation coefficient

Thus completes the proof of the Riemann hypothesis and remove the message from the Internet: «Here the famous Riemann hypothesis, that the real part of the root is always exactly equal to 1/2, no one has yet proven, although the proof of it would have been for the theory of prime numbers in the highest degree the importance. At the present time, the hypothesis is verified for seven million of the roots». With increasing power of prime numbers equation (7) for the critical line continues, but the graphs such as fig. 4 will be more frequent fluctuations due to higher growth. The growth is growing much more slowly than simple numbers. This will increase the power of the series.

The binary number for non-emergency lines. Then the third category with an increase in power $p(n)$ gets the physical meaning of the formula

$$z_2(i_2=3)\to\frac{1}{2}-0,70711\cos\left(\frac{\pi p(n)}{4}-\frac{\pi}{4}\right), \quad (8)$$

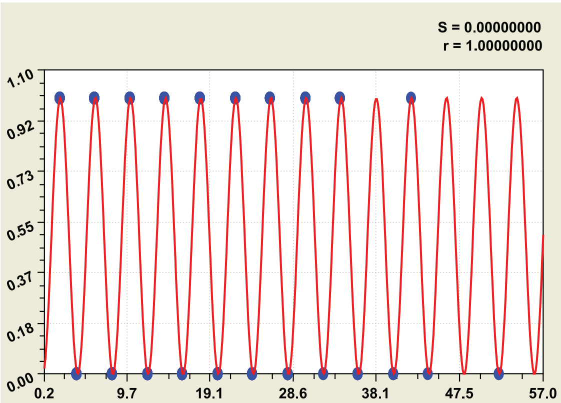
as shear waves 0,78539815 almost coincides with the value of the angle of $\frac{\pi}{4}=0,7853975\ldots$

Check the law

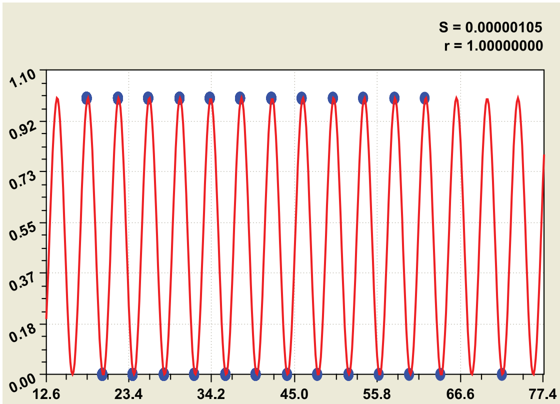
$$z_2(i_2=2)=\frac{1}{2}-\frac{1}{2}2\cos\left(\frac{\pi p(n)}{2}\right).$$

On the critical line $i_2=2$ indicated this model is stable and the other quantities of prime numbers (fig. 5).

Primary growth. This – the third parameter (the first – a critical line 1/2), giving a picture of the growth rate of prime numbers. Parameter $p_p(n)$ for a number of 100 000 prime numbers are shown in table 4, and he compiled the first appearance of the subsequent term. Primary growth is irregular, for example, an increase of 14 comes after 8 and earlier values of 10 and 12.



Increase in the number of prime numbers from 3000 members



Increase of more than 16 in a number of 100 000

Fig. 5. Graphs of law the distribution of the binary digits 0 and 1: *S* – dispersion; *r* – correlation coefficient

Various font allocated triangles (patterns of geometry) with sides (with $i_2=1$ – non-trivial zeros). Then the harmonious geometrical structures define the algorithm capacity growth, and even prime number.

Line growth varies with the initial constant «deuce», and there will be fluctuations, the trend

$$p_P(n)=2+2,09287\,p(n)^{2,09287}\exp(-0,31341p(n)^{1,06442}). \quad (9)$$

The envelope of the line. Increments to the left of the asymptotic lines have trivial zeros. Therefore, taken into account the wave envelope line, which in different places concerns a critical line $i_2=2$. This – the fourth parameter of the series. Divide the increase in two parts $p(n)=p'(n)+p''(n)$. On the envelope line by line in the table (fig. 6) are located $p'(n)=2^{i_{2\max}-1}$. And in the $0\le p''(n)=2^{i_{2\max}-1}-1$. The trend with unit from the formula with three fluctuations looks like

$$p'(n)=1+0,59470\,p(n)^{1,06436}+\ldots \quad (10)$$

Table 4

The primary increase
in the number of 100 000

Prime number $a(n)$	Growth $p(n)$	Binary digit i_2					
		6	5	4	3	2	1
		Part of increase					
		32	16	8	4	2	1
3	2					1	0
7	4				1	0	0
23	6				1	1	0
89	8			1	0	0	0
113	14			1	1	1	**0**
139	10			1	0	**1**	**0**
199	12			1	**1**	**0**	0
523	18		1	**0**	**0**	1	0
887	20		1	**0**	**1**	0	0
1129	22		**1**	0	1	**1**	0
1327	34	**1**	0	**0**	0	1	**0**
1669	24		**1**	1	**0**	**0**	0
1831	16		1	**0**	**0**	**0**	0
2477	26		1	**1**	**0**	1	**0**
2971	28		**1**	1	1	**0**	**0**
4297	30		1	**1**	1	**1**	**0**
5591	32	1	0	0	**0**	0	0
9551	36	1	0	**0**	1	**0**	0
15683	44	1	**0**	1	1	0	**0**
16141	42	**1**	0	1	0	1	0
19333	40	1	**0**	1	0	0	0
19609	52	1	1	**0**	1	0	0
28229	48	1	1	0	**0**	0	0
30593	38	1	0	0	1	**1**	0
34061	62	1	1	1	1	1	**0**
35617	54	1	1	0	1	1	0
45893	50	1	1	0	0	1	0
58831	58	1	1	1	0	1	0
81463	46	1	0	1	1	1	0
82073	56	1	1	1	0	0	0

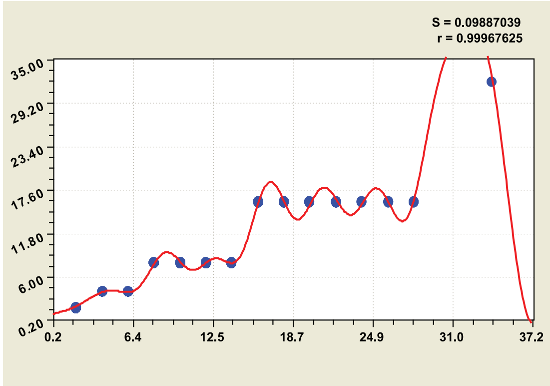


Fig. 6. The graph of the envelope line growth numbers 500

At $n \to \infty$ in the formula (10) always will be in the beginning 1.

Conclusions

The critical line Riemann is located in a vertical column $i_2 = 2$ binary matrix of growth of number of simple. Not all non-trivial zeros lie on it. There is also a line of benchmarks, the initial rate and the bending around.

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