THE LUCKY PRIME NUMBER THEOREM

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Abstract:

In this paper is described the asymptotic distribution of the lucky prime number with the lucky prime number theorem.

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1. THE LUCKY PRIME NUMBER THEOREM

A **lucky number** is a natural number in a set which is generated by a certain "sieve". This sieve is similar to the Sieve of Eratosthenes that generates the prime numbers, but it eliminates numbers based on their position in the remaining set, instead of their value (or position in the initial set of natural numbers).

A "**lucky prime**" is a lucky number which is also prime.

Let $\pi(n)$ be the prime-counting lucky function that gives the number of lucky primes less than or equal to n:

$$\mathbf{\Pi(n)} \approx \frac{3n}{2\ln^2(n)}$$

So we have that the n th lucky prime number L_n satisfies:

$$\mathbf{L_n \approx \frac{2}{3} n * \ln^2(n)}$$

The n-th lucky prime gap, denoted Δ_n is the difference between the $(n + 1)$-th and the n-th lucky prime numbers:

$$\mathbf{\Delta_n < \frac{4}{9} \ln^4(n)}$$

The values are lower to the **maximum lucky prime gap** $\mathbf{\Delta_{MAXn} = \frac{4}{9} \ln^4(n)}$**.**

Of course with this theorem there are infinitely many lucky primes.

In tab. 1 we have a list of n from 10 to 1.000.000.000:

TAB. 1

n	COUNTING PRIME LUCKY NUMBER	COUNTING LUCKY PRIMENUMBER ESTIMATED (3/2*n/ln(n)^2)	*n* th LUCKY PRIME NUMBER	*n* th LUCKY PRIME NUMBER ESTIMATED 2/3*n*ln(n)^2	MAX GAP LUCKY PRIME NUMBER	MAX GAP LUCKY PRIME NUMBER ESTIMATED 4/9*ln(n)^4
10	2	2,8	127	35,3	48	12,5
100	9	7,1	3307	1413,8	156	199,9
1000	43	31,4	75193	31811,4	654	1012,0
10000	211	176,8	1191163	565535,8	1344	3198,3
100000	1300	1131,7		8836496,9		7808,4
1000000	8616	7858,8		127245554,7		16191,4
1,E+07	62446	57738,3		1731953382,8		29996,6
1,E+08	469146	442058,7		22621431938,0		51172,9
1,E+09	3656784	3492809,2		286302497965,8		81969,1

2. REFERENCES

1) *Weisstein, Eric W.* *"Lucky Number"*. *MathWorld*.