

P != NP – FINAL PROOF OF THE MILLENNIUM THEOREM

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ABSTRACT

We prove the nonequivalence of P and NP classes via comparison of the speed of growth of polynomial and non-polynomial functions and approximated limit for both of them.

INTRODUCTION

The problem was first stated by Stephen Cook, from that time on now we have no defined answer if there's the possibility of finding the polynomial solution for NP-complete problems.

We assume that the growing speed of polynomial and non-polynomial functions is compared to each other:

$$O(n^t) < O(2^n) < O(n!) < O(n^n), \quad (1).$$

PROOF

Since there's no known algorithms whose polynomial speed is faster than the speed of growth of non-polynomial functions like power-set or factorial, then it naturally follows that if P and NP are equal, then speed of algorithm steps in P is equal or greater than number of steps required for the NP-complete task:

$$\frac{\partial x^t}{\partial x} \geq \frac{\partial 2^x}{\partial x} \rightarrow P = NP, \quad (2).$$

The same applies to the factorial function and its equivalent value as function in form x^x .

As t is a free parameter then we see that:

$$t \cdot x^{t-1} < \ln(2) \cdot 2^x, \quad (3).$$

The inequality (3) is true for factorial also.

Thus, from (2) and (3) it naturally follows that the $P \neq NP$ as the speed of growing non-polynomial function is much bigger than the same speed defined by derivative of polynomial function in P. The plot of P and NP functions along with their derivatives can be seen on Figure 1.

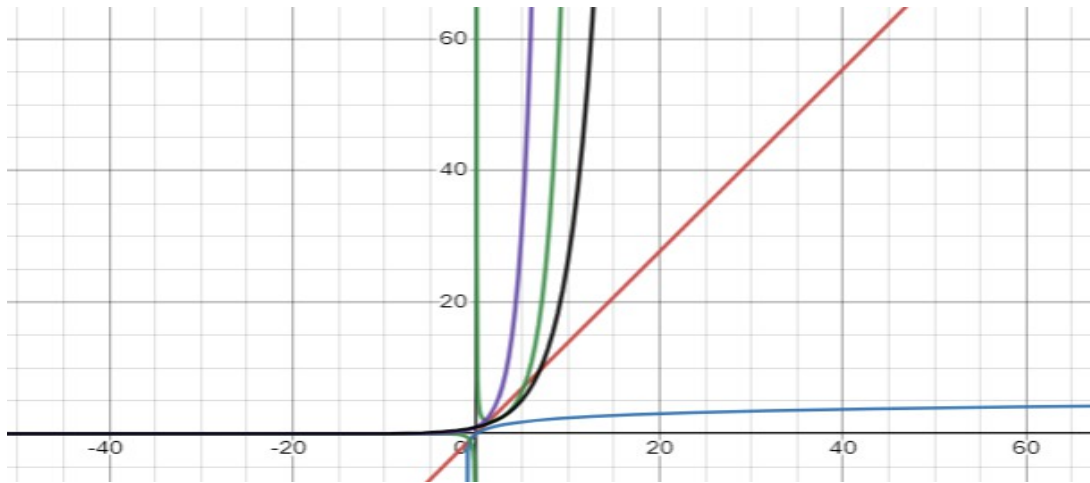


Figure 1. Graphical plot of functions and derivatives

CONCLUSION

We have shown that classes P and NP aren't equal over the fact of derivatives defining the speed of the polynomial and non-polynomial functions respectively. It naturally follows that even for infinite order of derivative comparison the speed of non-polynomial functions is still increasing while the speed of polynomial function converges to absolute zero:

$$\lim_{n \rightarrow \infty} \frac{\partial^n x^t}{\partial t^n} < \lim_{n \rightarrow \infty} \frac{\partial^n 2^x}{\partial t^n} < \lim_{n \rightarrow \infty} \frac{\partial^n x^x}{\partial t^n}, (4).$$

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