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Solution to P verse NP problem

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Abstract

The P vs NP theory is based on the successful theories of NP - completeness and complexity-based cryptography. NP - completeness theory originates from the work of Turing, Church and Gödel in the 1930s and stems from computability theory. The computability precursors of the classes P and NP are the classes of deterministic and nondeterministic languages, respectively.

Keywords- P vs NP problem, computability theory

I. INTRODUCTION

The P versus NP problem determines if a nondeterministic algorithm in polynomial time is also accepted by some (deterministic) algorithm in polynomial time (Cook, 2019, p.1). A P problem is one that can be solved in polynomial time and has an algorithm for its solution (Hosch 2019, p.1). An NP problem is one that can be guessed with no rule followed to make the guess and can be verified in polynomial time (Hosch 2019, p.1).

Problem statement: Does P = NP? (Cook, 2019, p.2).

II. METHOD

By using a system of two exponential functions derived from two logarithmic functions a solution to the P verse NP problem is found.

$x = \log_b y$ then $y = b^x$ (Washington 2005, p.373).

Let x equal the following.

$\log_b (\log P) = x$ let $b^x = NP$ (1)

$\log_b (\log NP) = x$ let $b^x = P$ (2)

Substituting x into the exponential equations.

$b^{\log P} = NP$ (3)

$b^{\log NP} = P$ (4)

$\therefore P \neq NP$

Determining a value for P.

From the exponential function 4 the following values are found

Let NP start at a value of 2.0 and b at a value of 2.0.

From equation (4):

$b^{\log NP} = P$

$2^{\log 2} = P$

P = 1.232023689

Determining NP from P using proportionality.

$\frac{a}{b} = \frac{c}{d}$ (Washington 2005, p.489).

$\frac{b}{P} = \frac{b'}{NP}$

$\frac{b'}{(\frac{b}{P})} = NP$ (5)

Where

b is b for P.

P is deterministic.

b′ is b for NP.

NP is non deterministic.

Creating a constant using proportionality.

From equation (4)

$b^{\log NP} = P$

P = 1.232023689

b = 2

$\frac{b}{P} = 1.62334541$

The constant of proportionality is 1.62334541.

Determining other values of NP using the constant of proportionality and any value > 1.0 for (b′) of NP.

For example:

$$\frac{b'}{(\frac{b}{P})} = NP \qquad (5)$$

Let b′ = 3

$\frac{3}{1.62334541} = NP$

NP = 1.848035533

Once the P problem has been computed in equation 4 we find the constant from the proportionality statement which is $(\frac{b}{P})$. Then assigning any value > 1.0 for b′ and dividing by the constant $(\frac{b}{p})$, other values can be determined quickly for NP.

III. RESULTS

From equation (4):

$b^{\log NP} = P$

The value of P in equation 4 is found to be 1.232023689 when NP is equal to 2.0. From this value and the value of b in equation 4, the constant of proportionality $(\frac{b}{p})$ is created and is equal to 1.62334541. Furthermore other values of NP are found using equation 5:

$\frac{b'}{(\frac{b}{p})} = NP$

CONCLUSION

It can be seen from the exponential functions 3 and 4 derived from the logarithmic equations 1 and 2 that P is not equal to NP. The NP problem can now be determined quickly using proportionality. The NP value is determined by randomly selecting any value > 1.0 for b′ of NP and dividing by the constant of proportionality. Therefore the P verse NP problem is solved by using exponential equations to first determine the value of P when the value of NP is 2.0.

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