The P vs NP or P = NP Conjecture

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Abstract: ***The p vs np problem was first introduced by Stephen Cook in 1971 in his seminal paper, the complexity of theorem proving procedures and independently by Leonid Levin in 1973. It is one of the seven millennium prize problems selected by the Clay Mathematics Institute since 2000 each worth US$1,000,000 prize for the first correct solution. Having the solution of p = np at hand has a lot of positive implications that would change the face of the world although it has some negative impacts that can easily be fixed with time. The following are some of the importance of proving p = np. It is used in Computer Science, Computational theory, Economics e.g. Industrial production, Cryptography, Artificial Intelligence, Game theory, Philosophy etc. Some of the dangers of proving p = np include the field of cryptography which relies on certain hard problems that protect passwords. It will therefore, break most of the existing Cryptosystems such as block chain Crypto-currencies e.g. Public-key Crypto- currencies, e.g. Bitcoin, Symmetric Chippers used for encryption of communications data, Crypto-graphic system that underlines the block chain Crypto-Currencies and for software authentication.***

Keywords: P versus np, algorithm, Boscomplex constant n = 1, Boscomplex theorem, probability, infinity

1. Introduction

The p versus np problem simply written as p = np is a major unsolved problem in theoretical computer science. It is one of the seven millennium Mathematics problems selected by the Clay Mathematics Institute in the year 2000, to be awarded US$1,000,000 each. The question asks whether every problem whose solution can easily be verified can also be easily solved. P stands for deterministic polynomial time which is the general class of questions for which some algorithm can provide an answer in polynomial time. NP stands for nondeterministic polynomial time, which is a class for which an answer can be verified in polynomial time quickly but there is no known way to find an answer quickly. Proving p = np question would determine whether problems that can be verified in polynomial time can also be solved in polynomial time. If it's proved that p ≠ np, then it would mean that problems in np are harder to compute than to verify. This means the problems in np could not be solved in polynomial time.

2. Proof/ Method:

If

$p = n\,p$ ---------- **(1)**

$\Rightarrow n = \frac{p}{p}$

$\therefore n = 1$

Hence $p = n\,p = 1 \times p$

$\therefore p = p$ ----------- **(2)**

This therefore, implies that the conjecture is true only if and if n = 1.

Therefore, $p \neq n\,p$, if $n <$ or > 1

Alternatively;

From 1,

$p = n\,p$

$\Rightarrow p - np = 0$

$\therefore (1 - n)\,p = 0$ --------- **(3)**

Either $p = 0$

Or $1 - n = 0$

$n = 1$

Or from $(1 - n)\,p = 0$

$\Rightarrow p = \frac{0}{(1-n)}$ ------- **(4)**

$\therefore p = 0$

Check:

From $(1 - n)\,p = 0$

$\Rightarrow 0(1 - n) = 0$

$\therefore 0 = 0$

Or from $p = n\,p$

$\Rightarrow 0 = 1(0)$

$\therefore 0 = 0$

$\Rightarrow p = n\,p$

If n < 1

Let $n = 0.5$

From $(1 - n)\,p = 0$

$\Rightarrow (1 - 0.5)\,p = 0$

$0.5\,p = 0$

$\therefore p = 0.$

Alternatively;

From (1),

$p = np$

Squaring both sides, i have

$p^2 = n^2 p^2$ -------- **(5)**

$\Rightarrow p^2 - n^2 p^2 = 0$ ------ **(6)**

$\therefore (1 - n^2)\,p^2 = 0$ ------- **(7)**

Hence $(1^2 - n^2)\,p^2 = 0$ ------ **(8)**

But $(1^2 - n^2)$ is a difference of two squares.

$\Rightarrow [(1 - n)(1 + n)]\,p^2 = 0$, where $n = 1$, $p \leq \pm \infty$.

Check:

From $[(1 - n)(1 + n)]\,p^2 = 0$

$[1 + n - n - n^2]\,p^2 = 0$

$\therefore (1 - n^2)\,p^2 = 0$ as above.

Therefore, $(1 - n^2)$ or $(1^2 - n^2)$ or $(1 - n)(1 + n)$ is the coefficient of p^2 since $(1^2 - n^2)$ is the difference of two squares.

Check:

From $(1 - n^2)\,p^2 = 0$

$\Rightarrow p^2 = \frac{0}{(1-n^2)}$

$p^2 = 0$

∴ p = 0 as in (4).

When n = 0,
From $(1 - n^2)\, p^2 = 0$
=> $(1 - 0^2)\, p^2 = 0$.
=> $p^2 = 0$
p = 0 as before.

When n < 1

(i) Let n = 0.5
From $(1 - n^2)\, p^2 = 0$
=> $p^2 = \frac{0}{(1-n^2)}$
∴ p = 0 as before.

(ii) Let n = - 0.5
From (1- n) p = 0
=> $p = \frac{0}{[1-(-0.5)]}$
∴ p = 0 as before.
When n > 1
(i) Let n = 1.5
From $(1- n^2)\, p^2 = 0$
=> $(1 - 1.5^2)\, p^2 = 0$
$p^2 = \frac{0}{(1-1.5^2)}$
∴ p = 0
Or from (1 - n) p = 0
p = 0 as above.

Alternatively we can cube equation 1

$P^3 = (np)^3$
$P^3 = n^3p^3$
$p^3 - n^3p^3 = 0$
=> $(1 – n^3)\, p^3 = 0$
Similarly $p^4 = n^4p^4$
=> $p^4 – n^4p^4 = 0$
$(1 – n^4)\, p^4 = 0$

Alternatively if both sides of p = np are raised to an unknown power of say m, the following expression is obtained.

From p = np,
=> $p^m = (n\,p)^m$
=> $p^m = n^m p^m$
$(1 – n^m)\, p^m = 0$
OR from $p^m = (n\,p)^m$
=> $n^m p^m - p^m = 0$
$(n^m – 1) = 0$
Either $n^m - 1 = 0$
$n^m = 1$
Or $p^m = 0$

Therefore, m = 0, 1, 2, 3, 4… ꚙ, ꚙ + 1, ꚙ+ 2…

Note: This implies that for n < 1, p = np only if and if p = 0.

Therefore, the algorithms for p = np problem are;

1) (1 - n) p = 0; where n = 1, p ≤ ±ꚙ and (1 - n) is the coefficient of p.
2) $(1 - n^2)\, p^2 = 0$, n = 1, p ≤ ± ꚙ, Where $(1- n^2)$ is the coefficient of p^2.Therefore, n = 1 is Boscomplex constant.
3) $[(1-n)(1+n)]\, p^2 = 0$, the expanded form of $(1 - n^2)\, p^2 = 0$.
4) $[1 – n^m]\, p^m = 0$ or $(n^m – 1)\, p^m = 0$ is the general form of the algorithm for p = np.

Therefore, $(n^m – 1)\, p^m = 0$ or $(1 - n^m)\, p^m = 0$ is the algorithm for p vs np or p = np problem known as Adriko Boscomplex theorem of p = np. We can multiply both sides of $(p^m - 1)p^m = 0$ by any large number to obtain very large numbers since p = np e.g. $1000^{10}(n^m - 1pm=100010(0)$

From p = np,
=> kp = knp where $k= 10^{20}$

Substituting for k and Squaring both sides I have$(10^{20}p)^2 = (10^{20}np)^2$
=>$10^{40}p^2 = 10^{40}n^2p^2$
=>$10^{40}n^2p^2 - 10^{40}p^2 = 0$
$10^{40}(n^2 - 1)p^2 = 0$
For $n^2 = n^m$, I have $(n^m - 1)p^2 = 0$

Example 1
If p = 4, prove that p = np.

Solution:

Method 1
From p = np
=> n = 1.
Hence 4 = 1(4)
∴ 4 = 4
Hence p = np

Method 2
From $(1 - n^2)\, p^2 = 0$,
Given p = 4.
=> $(1 - n^2)\, 4^2 = 0$
$1 - n^2 = 0$
n = ± 1

From p = np

When n = +1, p = 4
=> 4 = 1(4)
4 = 4 as above
∴ p = np.

When n = -1, p = 4.

From p = np,
=> 4 = - 1(4)
4 ≠ - 4
=> p ≠ np

The condition p = np is only satisfied if n = 1.

Example 2

If p = - 4, prove that p = np.
Solution:

Method 1:
Given p = np,
=> n = 1
From (1 - n) p = 0
=> (1- n) (-4) = 0
- 4 + 4n = 0
4n = 4
∴ n = 1

From p = np
=> - 4 = 1(-4)
- 4 = - 4
∴ p = np.

Method 2
From $(1 - n^2)\ p^2 = 0$
Given p = -4, n = ?
=> $(1 - n^2)$ (-4) = 0
$(1 - n^2) = 0$
n = ± 1

Check
When n = 1, p = - 4
=> - 4 = 1 x - 4
- 4 = - 4, hence p = np.
When n = - 4, p = - 4;
=> - 4 = -1(-4)
- 4 ≠ 4
Therefore, p ≠ np if n < 1 or n > 1.

Example 3
If p = $10^{1,000,000,000,000,000,000,000}$.
a) Find the value of n.
b) Prove that p = np.

Solution:

a) Method 1
From $(1 - n^2)\ p^2 = 0$
=>$(1 - n^2)10^{1,000,000,000,000,000,000,000} = 0$
=> $(1 - n^2)10^{21} = 0$
=> $(1 - n^2) = 0$
n = ± 1. Ignore n = -1
Hence n = 1

Method 2:
From (1 - n) p = 0
=> (1 - n) 10^{21} = 0
=> (1 - n) = 0
∴ n = 1, as above

Method 3:
From p = np
=>$\frac{p}{p}$ = n
∴ 1 = n as above.
b) From p = np
=> $10^{21} = 1(10^{21})$
∴ $10^{21} = 10^{21}$. Hence proven.

Example 4
If p = -10^{21}. Find the value of n, hence prove that p = np.

Solution:
From (1- n) p = 0
(1- n)(-10^{21}) = 0
=> 1- n = 0
n = 1.
From p = np
=> $-10^{21} = 1(-10^{21})$
∴ $-10^{21} = -10^{21}$.
Hence p = np, proved.

Example 5
Given p = np and p = ꝏ. Use Boscomplex theorem for p = np;
a) Find the value of n.
b) Prove that p = np.

Solution:
a) From $(1 - n^2)\ p^2 = 0$
=> $(1 - n^2)$ ꝏ = 0
=> $1 - n^2 = 0$
$n^2 = 1$
n = ± 1. Ignore n = -1.
∴ n = 1.
b) From p = np
=> ꝏ = 1(ꝏ)
∴ ꝏ = ꝏ
=> p = np hence proven.

Example 6
If p = ꝏ + 1, use Boscomplex theorem for p = np to;
a) Find the value of n in p = np.
b) Prove that p = np.

Solution:
a) From Boscomplex theorem of $(1 - n^2)\ p^2 = 0$,
Given p = ꝏ + 1.
=> $(1 - n^2)$ (ꝏ + 1) = 0

Divide both sides by (ꝏ + 1)
=> $(1 - n^2) = 0$
n = ± 1

Ignore n = -1 since p = np only if n = + 1.
∴ n = 1.

b) Substitute for n and p in p = np.
=> (ꝏ + 1) = 1(ꝏ + 1)
(ꝏ + 1) = (ꝏ + 1)
ꝏ = ꝏ, note that (ꝏ + 1) = ꝏ
∴ p = np

A distribution table for p vs. np (i.e. p = np).

n	p	p^2	np	np^2	n^2p^2	$p.p^2 = p^3$	…
1	1	1	1	1	1	1	…
1	2	4	2	4	4	8	…
1	3	9	3	9	9	27	…
1	4	16	4	16	16	64	…
1	5	25	5	25	25	125	…
1	6	36	6	36	36	216	…
1	7	49	7	49	49	243	…
1	8	64	8	64	64	512	….
1	9	81	9	81	81	729	…
1	10	100	10	100	100	1000	…
⋮	⋮	⋮	⋮	⋮	⋮	⋮	…
1	p - 2	p^2-2p+1	p-2	p^2-4p+4	p^2-4p+4	$(p-2)^3$	…
1	p-1	p^2-2p+1	p-1	p^2- 2p+1	p^2-4p+1	$(p-1)^3$	…
1	∞	∞^2	∞	∞^2	∞^2	∞^3	…
1	∞+1	$\infty^2+2\infty+1$	∞+1	$\infty^2+2\infty+1$	∞+1	$(\infty+1)^3$	…
1	∞+2	$\infty^2+4\infty+4$	∞+2	$\infty^2+4\infty+4$	∞+2	$(\infty+2)^3$	…
⋮	⋮	⋮	⋮	⋮	⋮	⋮	…
∑n = ..	∑p = ..	$\sum p^2$ =..	∑np =..	$\sum np^2$ ...	$\sum n^2p^2$ ...	$\sum p^3$ ...	…

From the above derivations and the table values, it's clear that p = np and $p^2 = n^2p^2$, etc.

Worked examples

Example 1

If p = 1, 2, 3, 4, 5, 6 and 7 such that p = np. By using Boscomplex theorem;

a) Find the mean of p.
b) Find Boscomplex constant, n.
c) Find the value of; $\frac{(\sum p^2)}{(\sum p)}, \frac{(\sum n^2p^2)}{(\sum p)}, \frac{\sum n^2p^2}{\sum np}$, and compare them.
d) Calculate the standard deviation.
e) Find the variance of p.

Solution:

Table of values

n	p	p^2	np	np^2	n^2p^2	$p.p^2 = p^3$
1	1	1	1	1	1	1
1	2	4	2	4	4	8
1	3	9	3	9	9	27
1	4	16	4	16	16	64
1	5	25	5	25	25	125
1	6	36	6	36	36	216
1	7	49	7	49	49	243
∑n = 7	∑p = 28	$\sum p^2$ = 140	∑np = 28	$\sum np^2$ = 140	$\sum n^2p^2$ = 140	$\sum p^3$ = 684

Check:

a) $\bar{p} = \frac{\sum np}{\sum n} = \frac{28}{7} = 4$

Or $\bar{p} = \frac{\sum p}{\sum n} = \frac{28}{7} = 4$

Mean of ungrouped data, $\bar{p} = \frac{\sum p}{\sum n}$

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

$=> \bar{p} = 4$ as above.

b) Boscomplex constant, n = $\frac{\sum np}{\sum p} = \frac{28}{28} = 1$

$\therefore$ n = 1

Or Boscomplex constant, n = $\frac{\sum n^2p^2}{\sum p^2}$

$\therefore n = \frac{140}{140} = 1$ as above

$=> \frac{\sum(np)}{\sum p} = \frac{\sum n^2p^2}{\sum p^2} = 1$= n, Boscomplex constant.

c) $\frac{\sum n^2p^2}{\sum p^2} = \frac{140}{28} = 5$

$= \frac{\sum n^2p^2}{\sum np} = \frac{140}{28} = 5$

Also $\frac{\sum p^2}{\sum p} = \frac{140}{28} = 5$

$\therefore \frac{\sum n^2p^2}{\sum p} = \frac{\sum n^2p^2}{\sum np} = \frac{\sum p^2}{\sum p} = 5$

Note: $\frac{\sum p^2}{\sum np}$ is also equal to 5

I.e. $\frac{\sum p^2}{\sum np} = \frac{140}{28} = 5.$

d) Standard deviation, σ

From $\sigma = \sqrt{\left[\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2\right]}$

$=> \sigma = \sqrt{\left[\left(\frac{\sum np}{\sum n}\right) - \left(\frac{\sum np}{\sum n}\right)^2\right]}$

$= \sqrt{\left[\frac{140}{7} - \left(\frac{28}{7}\right)^2\right]}$

$= \sqrt{\frac{140}{7} - \frac{784}{49}}$

$= \sqrt{\frac{980-784}{49}}$

$= \sqrt{\frac{196}{49}} = \frac{14}{7} = 2$

$\therefore \sigma = 2$

e) Method 1

From Var. (p) = σ^2
=> Var. (p) = 2^2 = 4.

Method 2

From Var. (p) = σ^2

=> Var. (p) = $\left[\sqrt{\left(\frac{\sum np^2}{\sum n}\right) - \left(\frac{\sum np}{\sum n}\right)^2}\right]^2$

=> Var. (p) = $\left(\frac{\sum np^2}{\sum n}\right) - \left(\frac{\sum np}{\sum n}\right)^2$

$= \frac{140}{7} - \left(\frac{-28}{7}\right)^2$

Var. (p) $= \frac{140}{7} - \frac{784}{49}$

∴ Var. (p) = $\frac{196}{49}$ = 4 as above.

Example 2

Below is an example for negative values of p where p = np; p = -1, -2, -3, -4, -5, -6 and -7.

a) Find the mean of p.
b) Find Boscomplex constant n.
c) Find the value of;
i) $\frac{\sum p^2}{\sum p}$
ii) $\frac{\sum n^2p^2}{\sum p^2}$
iii) $\frac{\sum n^2p^2}{\sum np}$. And compare them
d) Calculate the standard deviation.
e) Find the variance of p

Solution:

a) Table of values

n	p	p^2	np	np^2	n^2p^2	p^3
1	-1	1	-1	1	1	-1
1	-2	4	-2	4	4	-8
1	-3	9	-3	9	9	-27
1	-4	16	-4	16	16	-64
1	-5	25	-5	25	25	-125
1	-6	36	-6	36	36	-216
1	-7	49	-7	49	49	-243
$\sum n$ = 7	$\sum p$ = -28	$\sum p^2$ = 140	$\sum np$ = -28	$\sum np^2$ = 140	$\sum n^2p^2$ = 140	$\sum p^3$ = 684

a) Mean $\bar{p} = \frac{\sum np}{\sum n} = \frac{-28}{7}$
∴ $\bar{p}$ = -4.
Or Mean $\bar{p} = \frac{\sum p}{\sum n} = \frac{-28}{7}$ = -4 as above

b) Boscomplex constant, n = $\frac{\sum np}{\sum p}$
n = $\frac{-28}{-28}$ = 1.
Or n = $\frac{\sum n^2p^2}{\sum p^2} = \frac{140}{140}$ = 1 as above.

C (i) $\frac{\sum p^2}{\sum p}$ = -5
(ii) $\frac{\sum n^2p^2}{\sum p^2} = \frac{140}{-28}$ = -5
(iii) $\frac{\sum n^2p^2}{\sum np} = \frac{140}{-28}$ = -5
∴ $\frac{\sum p^2}{\sum n^2} = \frac{\sum n^2p^2}{\sum p} = \frac{\sum n^2p^2}{\sum np}$ = -5

d) σ = $\sqrt{\left[\left(\frac{\sum np^2}{\sum n}\right) - \left(\frac{\sum np}{\sum n}\right)^2\right]}$
$= \sqrt{\left(\frac{140}{7}\right) - \left(\frac{-28}{7}\right)^2}$
$= \sqrt{\frac{140}{7} - \frac{784}{49}}$
∴ σ = $\sqrt{\frac{196}{49}} = \frac{14}{7}$ = 2

e)

Method 1

From Var. (p) = σ^2
=> Var. (p) = 2^2 = 4.

Method 2

Var. (p) = $\sqrt{\left[\left(\frac{\sum np^2}{\sum n}\right) - \left(\frac{\sum np}{\sum n}\right)^2\right]}$
$= \sqrt{\left[\left(\frac{140}{7}\right) - \left(\frac{-28}{7}\right)^2\right]}$
$= \sqrt{\left(\frac{140}{7} - \frac{784}{49}\right)}$
$= \frac{196}{49}$ = 4 as above.

NB: Since $\sum p = \sum np^2 = \sum n^2p^2$, we can substitute np^2 with either p^2 or n^2p^2 while calculating the standard deviation and the variance of p.

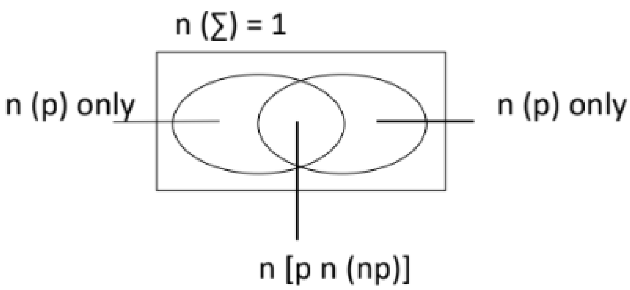
Probability view of p = np or p vs np.

From the above information/data, since n = 1 is a constant known as Boscomplex constant.

Case 1

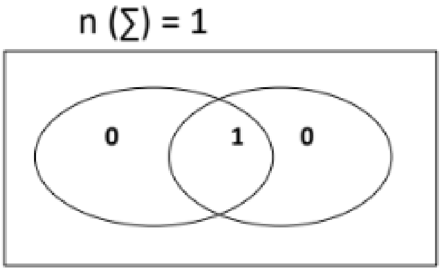
From p = np, if p is say 1,

=> p = 1x p, but p itself has a hidden coefficient of 1.
=> 1 x p = 1 x p. Therefore, 1 is equal to [p n (np)]. In set theory the above information can be represented as below.



From n (p) = 1
P [(p n np)] = $\frac{1}{2\infty - 1}$
$= \frac{1}{\infty}$

n (p) only = n (p) – n [p n (np)] = 1- 1 = 0
∴ n (p) only = 0
Similarly, n (np) only = 1 - 1 = 0



From here we can calculate the probability of p(p), p(np) and p[p n (np)].

a) P (p) only = $\frac{n\ (p)}{n\ (\sum)} = \frac{0}{1} = 0$
b) P (np) only = $\frac{n\ (np)}{n\ (\sum)} = \frac{0}{1} = 0$
c) P [p n (np)] = $\frac{n\ [p\ n\ (np)]}{n\ (\sum)} = \frac{1}{1} = 1$

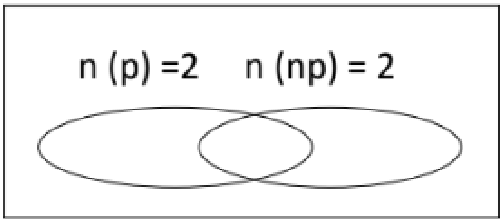
From the above probabilities, we can see that p = np.

Check:

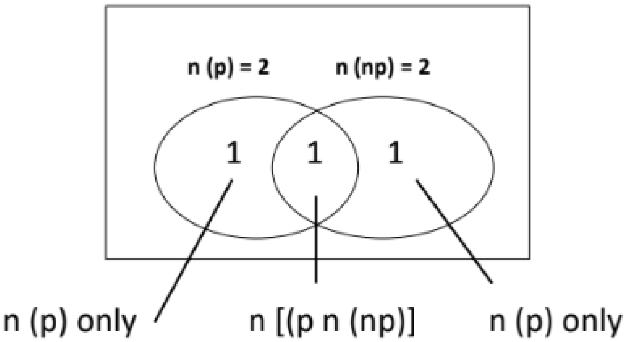
From p (p) + p [p n (np)] + p (np) = 1
=> 0 + 1 + 0 = 1

Case 2

If p = 2, we shall obtain the following probabilities:
n(Σ) = ?



n (p) only = n (p) - n[p n (np)] = 2 -1
∴ n (p) only = 1
n (np) only = n (np) – n ([p n (np)]
= 2 - 1 = 1
∴ n (np) = 1
n (∑) = 3



(i) P (p) only = $\frac{n\ (p)}{n\ (\sum)} = \frac{1}{3}$
(ii) P (np) only = $\frac{n\ (np)}{n\ (\sum)} = \frac{1}{3}$
(iii) P [p n (np)] = $\frac{n\ [p\ n\ (np)]}{n\ (\sum)} = \frac{1}{3}$

Since P (p) = P (np) = $\frac{1}{3}$. This implies p = np.

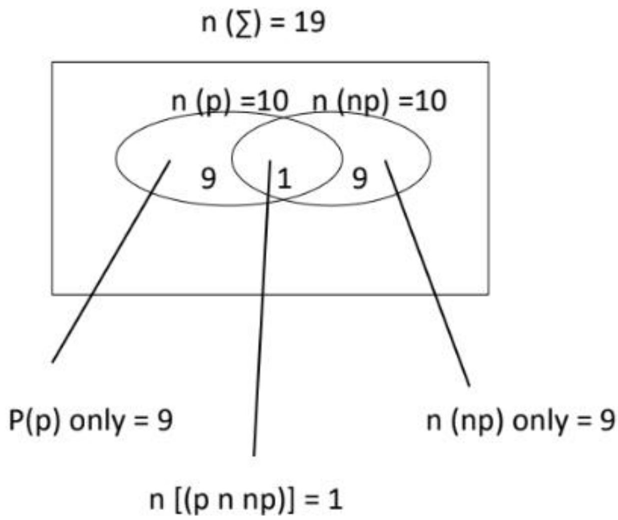
NB: P (p) + p (np) + p [p n(np)] = 1.

Since [p n (np)] = n = 1, this implies Boscomplex constant n = [p n (np)] = 1.

Case 3

If p = 10, the following Venn diagram is obtained.

Venn diagram



a) P (p) only = $\frac{n\ (p)}{n\ (\sum)} = \frac{9}{19}$
=> n (∑) = n (p) + n (np) – n [p n (np)]
But n [(p n (np)] = Boscomplex constant n = 1
∴ n (∑) = n (p) + n (np) - n
= 10 + 10 - 1
∴ n (∑) = 19

b) P (np) only = $\frac{n\ (np)}{n\ (\sum)} = \frac{9}{19}$

c) P [p n(np)] = $\frac{1}{19}$

Check:

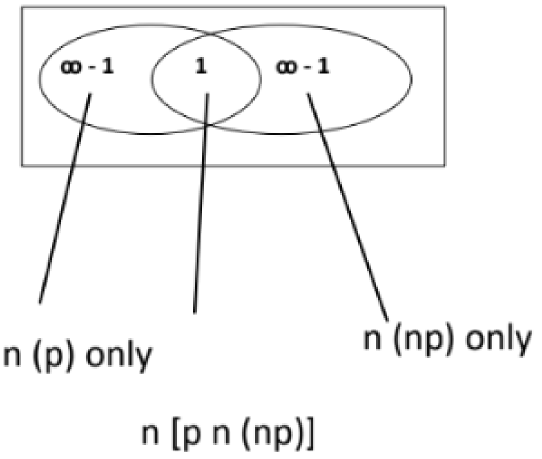
P (p) + p (np) + P [p n (np)] = $\frac{9}{19} + \frac{1}{19} + \frac{9}{19}$
$= \frac{19}{19} = 1$

Case 4

If p = ꝏ, the Venn diagram below is obtained.

Venn diagram

n (∑) = 2ꝏ -1



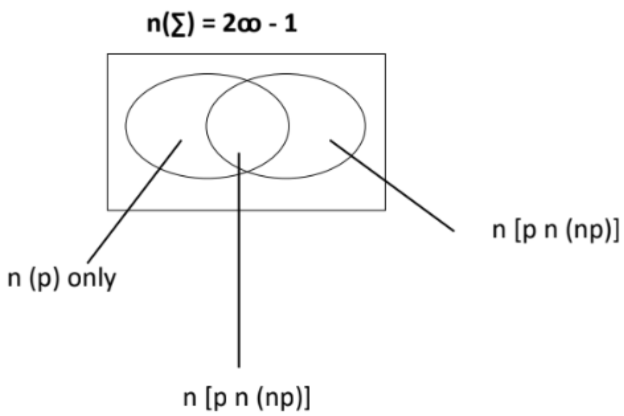
a) n (∑) = n (p) only + n [p n (np)] + n (np) only
= n (p) only + n + n (np) only
= ꝏ - 1 + ꝏ + ꝏ - 1
n (∑) = 2ꝏ - 1 or ꝏ
b) P (p) only = $\frac{n\ (p) only}{n\ (\sum)} = \frac{(ꝏ-1)}{(2ꝏ-1)}$
∴ P (p) only = ꝏ, since 2ꝏ - 1 is extremely a very high value at infinity compared to ꝏ - 1.

Also ꝏ - 1 = ꝏ, 2ꝏ - 1 = ꝏ.
∴ $\frac{ꝏ}{ꝏ}$ = ꝏ.

c) P (np) only = $\frac{n\ (np)}{n\ (\sum)} = \frac{(ꝏ-1)}{(2ꝏ-1)}$
=> P (np) only = $\frac{ꝏ}{ꝏ}$ = ꝏ

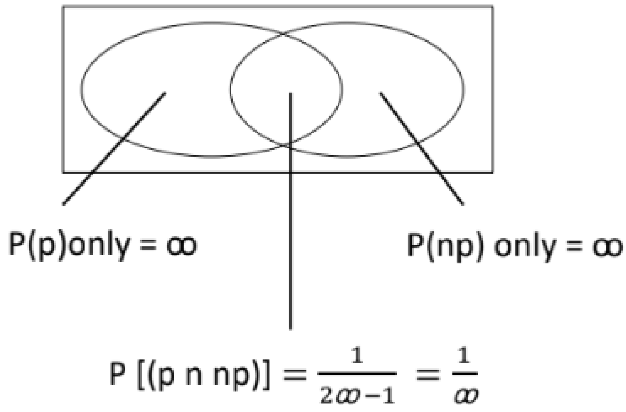
d) P [p n (np)] = $\frac{n\ [p\ n\ (np)]}{n\ (\sum)}$
= $\frac{1}{(2ꝏ-1)}$
= $\frac{1}{ꝏ}$

Venn diagram



Venn diagram

n (∑) = 2ꝏ - 1



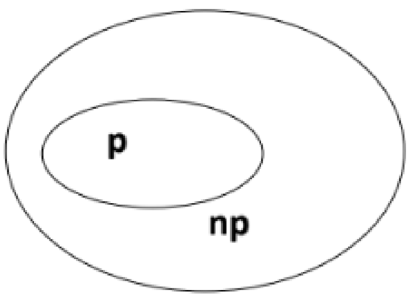
Checking:

From p (A) + p (A n B) + p (B) = 1.
=> P (p) + p [p n (np)] + p (np) = 1
=>$\frac{(ꝏ-1)}{(2ꝏ-1)} + \frac{1}{(2ꝏ-1)} + \frac{(ꝏ-1)}{(2ꝏ-1)} = 1$

Or p (p) + p[$p\ n(np)$]+ p (np) = 1
= ꝏ +$\frac{1}{ꝏ}$+ ꝏ = 1
= $\frac{(2ꝏ^2+1)}{ꝏ} = \frac{ꝏ}{ꝏ} = 1$
=>1 = 1 as above.
=>$\frac{ꝏ-1+1+ꝏ-1}{(2ꝏ-1)} = 1$
$\frac{2ꝏ-1}{2ꝏ-1} = 1$

=>$\frac{ꝏ}{ꝏ} = 1$
∴ 1 = 1 as above

NB: from the above calculations it is clear that p is a sub set of np as shown in the fig. below.



Graphs of p versus np.

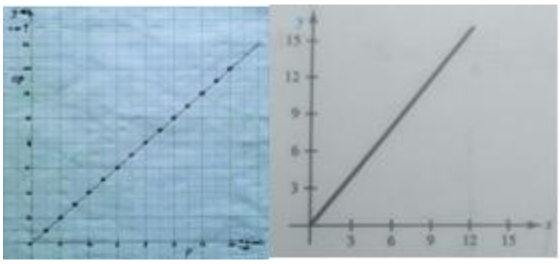
Graph of p vs np for positive values of p i.e. p = np or p - np = 0 .

Table of values:

p	1	2	3	4	5	6	7	8	9	10	⋯	∞
np	1	2	3	4	5	6	7	8	9	10	⋯	∞

Horizontal Scale; 1 cm: 1 unit

Vertical scale; 1 cm: 1unit



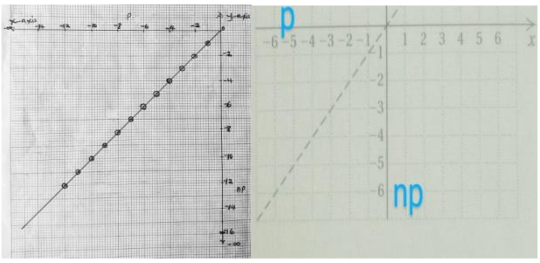
A graph of p vs np for negative values of p i.e. - p = -np or – p + np = 0.

Table of values

-p	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	⋯	∞
-np	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	⋯	∞

Horizontal scale; 1cm: 1 unit

Vertical; 1cm: 1 unit

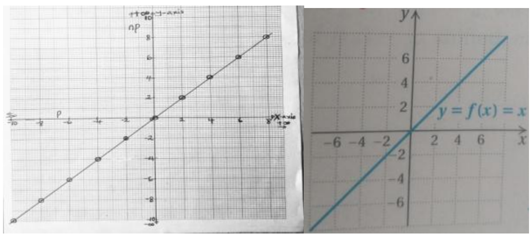


A graph of p = np i.e. p – np = 0 for both positive and negative values of p.

Table of values

p	-10	-8	-6	-4	-2	0	2	4	6	8	⋯	∞
np	-10	-8	-6	-4	-2	0	2	4	6	8	⋯	∞

Horizontal scale; 1 cm: 1 unit
Vertical; 1 cm: 1 unit



Since y = f(x) = x, this implies p = f(np) = np. Graphs of p = np, $p^2 = np^2$, $p^2 = n^2p^2$, $p^2 = n^2p^2$, $p^3 = n^3p^3$… in that order all give linear graphs passing through the origin. Therefore, the graph of p = np is in linear form y = mx + c where the constant, c = 0. Hence y = mx. The gradient m = n = Boscomplex constant = 1. Therefore, p is directly proportional to np.

Applicability of P VS NP OR P = NP:

Having the solution of p = np at hand has a lot of positive implications that would change the face of the World although it has some negative impacts that can easily be fixed with time. The following are some of the importance of proving p = np. It is used in Computer science, Computational theory, Economics e.g. Industrial production, Cryptography, Artificial Intelligence, Game theory, Philosophy etc.

Dangers of Proving P = NP.

Some of the dangers of proving p = np include the field of cryptography which relies on certain hard problems that protect passwords. It will therefore, break most of the existing cryptosystems such as block chain crypto currencies e.g. Bitcoin, Public-key crypto currencies, Symmetric Chippers used for encryption of communications data, Cryptographic system that underlines the block chain Crypto currencies and for software authentication.

3. Comments

The p versus np is true i.e. p = np according to my working above. This implies that p which is a deterministic polynomial time is a sub set of np which is a nondeterministic polynomial time. Therefore, problems in both p and np can easily be solved and quickly checked for that matter. Large values of p can be used e.g. p = 2^{3321}. From p = np or $(n^m - 1)p^m = 0$, where n = 1, m = 3321, p = 2. This implies $2^{3321} = 1(2^{3321})$, hence 5.25551887382442 x 10^{999} = 5.25551887382442 x 10^{999}. Similarly, if p = $2^{3321.9}$, from p np, this implies $2^{3321.9} = 1(2^{3321.9})$, hence 9.8071449938451 x 10^{999} = 9.8071449938451 x 10^{999}. If $p = 2^{3322}$, this implies $2^{3322} = 1(2)^{3322}$. Therefore, ∞ = ∞. Both sides of p = np can be multiplied by any large number, say k in order to yield large values i.e. from p = np, this implies kp = knp, where k =1 since n = 1. Similarly if k = 10^{20}, I have $10^{20}p = 10^{20}p$. Squaring both sides , I have $10^{40}p^2 = 10^{40}n^2p^2$. Therefore, $10^{40}n^2p^2 - 10^{40}p^2 = 0$. Hence $10^{40}(n^2 - 1)p^2 = 0$. F0r $n^2 = n^m, 10^{40}(n^m - 1)p^2 = 0$

Author Profile

Adriko Bosco is a Ugandan from Terego District, an independent researcher in Mathematics. The career objective of the author is to develop Mathematics in Uganda and the world at large. He went to St. Joseph's college Ombachi , ICT - Makerere University Uganda. The author taught Physics, Mathematics, Chemistry and Biology in many schools in Uganda and South Sudan for over 18 years. He has many manuscripts in Mathematics since May 2020. This include; Riemann Hypothesis(RH), Goldbach's conjecture, Birch and Swinnerton-Dyer conjecture, The Beal conjecture, Fermat's Last Theorem, Twin prime conjecture, Diophantine equations, Solvability of Diophantine equations, Arbitrary quadratic forms, Deal with Pi (π) and Euler's constant, e, Algebraic number fields, Arithmetic mean etc. He is preparing a Mathematics book entitled THE BOOK OF GENIUSNESS.