

# Number Theory

Index  $\infty$

Name 1, 2, 3, 4, ...  
 level I, 1, 2, ...  
 Every odd

Prime

$p_{29} \rightarrow p_{30} \rightarrow p_{31}$   
 $p_{24561093} p_1$

Ref

- ✓ Diff 1st Am Bonus
- ✓ Sid's method
- Test of Math
- \* ✓ Advanced level Bonus

Putnam

$7^{13}$

7.7. .... 13 times.

$1697^{13}$

how many digits change? last digit

FLT

Remainder ..

$$\frac{a^n + 1}{n}$$

(2) Putnam dist 24  
mathematical representations

9062395123

(2)  $\frac{2}{3}$

Completed Key

7 49 343

(13) log??

Amirul

7 (13) →

~~69~~ 7<sup>13</sup>

(13) → log(4)

7 → 7<sup>1</sup> → 7

694 173729 → 2

$\frac{173729}{4} \rightarrow ①$

$\frac{29}{4} \rightarrow ①$

$\frac{173729}{2} \rightarrow ①$   
2 → 21

$\frac{173729}{2} \rightarrow ①$

(29)  
4 → 2

2  
173729 → ?  
32

173729 → ①  
8 → 2<sup>3</sup>

ISI xx

173729 → 1  
16

173729 →  
32

92714 72967  
Divide by 4 remainder 3

(67) → 4 → 4

→ 64 → last digit

6729  
1739

# cycle of 4

- 2
- 4
- 8
- 16
- 32
- 64
- 128
- 256
- 512
- 1024
- 2048
- 4096

- 3
- 9
- 27
- 81
- 343
- 1029
- 3087
- 1

④

0  
5

$0^1$   
 $0^2$

$0^n = 0$   
 $5^n = 5$

$1^n = 1$

0, 1, 5

⑥

6  
36  
216  
6  
6  
6  
6

2 → 1  
1 → 1  
2 → 2  
3 → 9  
3 → 9

7<sup>1234</sup>

→ 7<sup>34</sup> → 7<sup>2</sup> → 49

9062395123

#

$$\left( 54 \cdot 3^{1299} + 682 \cdot 43147 \right) \times 68 \cdot 131$$

alt  
ctrl  
h

$$\rightarrow \left( 3^{99} + 2^{47} \right) \times \left( 8^{31} \right)$$

$$\rightarrow \left( 3^3 + 2^3 \right) \times \left( 8^3 \right) \rightarrow \left( 27 + 8 \right) \times \left( 512 \right)$$

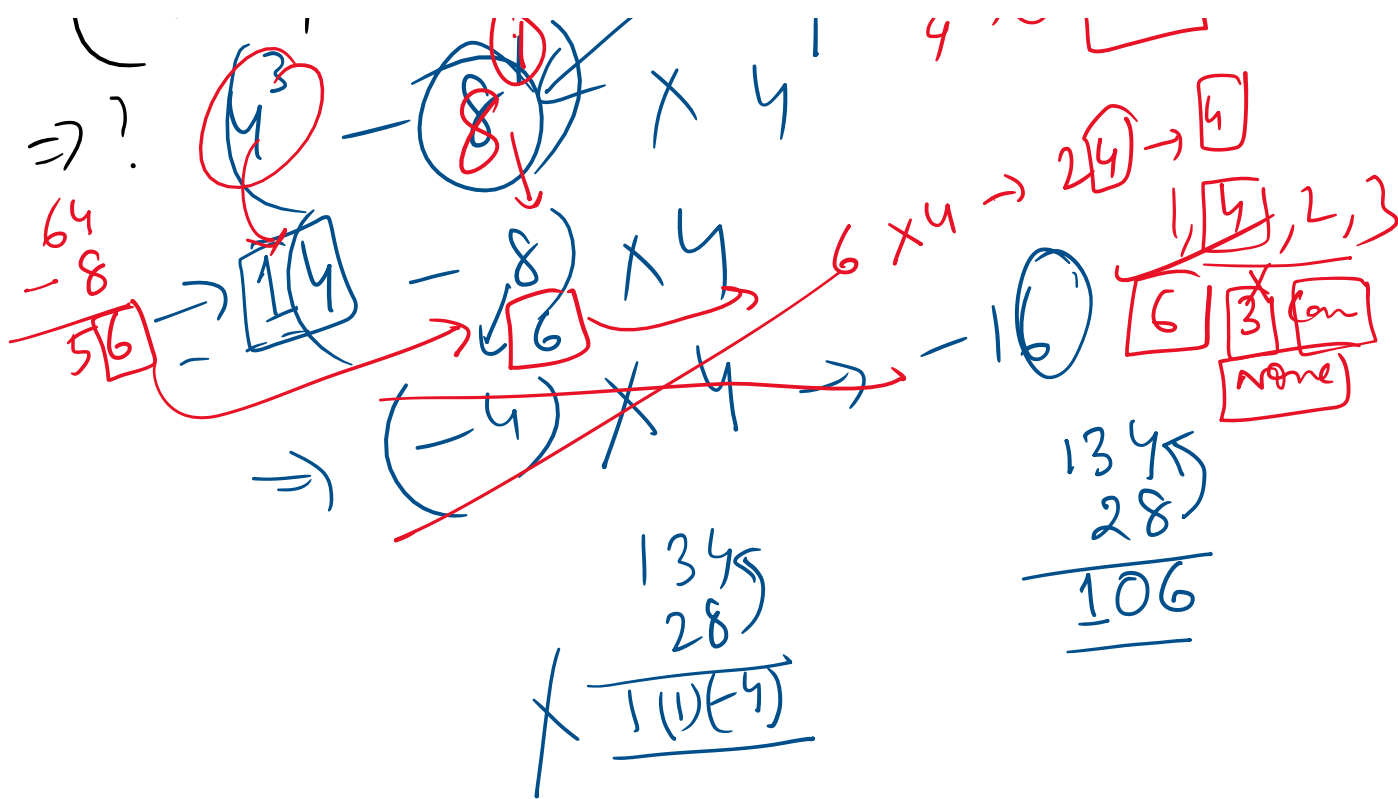
$$\rightarrow 35 \times 512$$

$$\rightarrow 0$$

$$\left( 1234^{47} - 128^{49997} \right) \times 524^{321}$$

1.3

97/4 → 0



AP ✓✓✓

$$\begin{array}{r}
 2x^{473} + 1 \\
 \hline
 473 \\
 26 \\
 24 \\
 27 \\
 6 \\
 \text{None}
 \end{array}$$

$$\begin{array}{r}
 2x^{473} + 1 \\
 \hline
 27
 \end{array}$$

None ✓  
 CND detected  
 Math Error  
 Data insufficient

$$\begin{array}{l}
 \frac{x}{0} \times \\
 a+b+c = 14 \\
 a+b = 8 \\
 2-3 = -1 \times \\
 \boxed{c=8} \\
 a, b = ??
 \end{array}$$

→ Degrees of freedom...  $(a+b+c) = 10$

→ Degrees of freedom...

$$5 - 3 \Rightarrow \boxed{2}$$

$$\boxed{\text{Dof} \geq 0}$$

$$\text{Dof} = 0$$

$$\begin{cases} a+b+c = 10 \\ a+b = 5 \\ a = 3 \\ 2c+b = 12 \\ 2b = 4 \end{cases}$$

$$a+b+c+d = \boxed{14}$$

$$\boxed{a, b, c, d \in \mathbb{N}}$$

How many possible solutions are there  $14 \# 4 - 1$

$$a_1 + a_2 + \dots + a_n = \psi_1$$

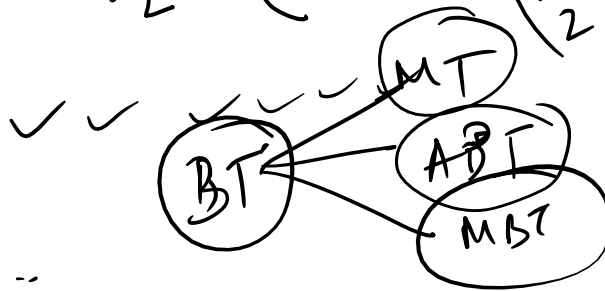
$$(a_2 + a_3 + \dots + a_n) = \psi_2$$

find the diff b/w the no of sol<sup>n</sup>.

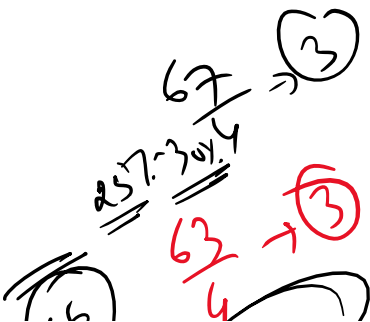
$$(\psi_1 + n - 1) C (n - 1) -$$

$$\psi_2 + \left(\frac{n}{2} - 1\right) C \left(\frac{n}{2} - 1\right)$$

\*\*



Let 3/4/5/2/6...



$$\begin{aligned} 721/4 &\rightarrow 0 \\ 125/4 &\rightarrow 1 \end{aligned}$$

16  
63 → 70  
4  
12 leah  
400

→ 7 3 → 7  
→ 7 3 → 7 → 3

125/4 → 0  
60/70  
4 6 4 6  
4,9  
1,2,3,4,5,6,7,9,0  
Perfect square

3000  
12 x 10 5

9<sup>1</sup> = 9  
9<sup>2</sup> = 81  
9<sup>3</sup> = 729  
9<sup>4</sup> = 6561

0

Next semester

2 dn | 3 | 4

Subject FLT