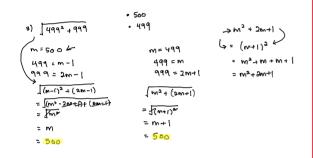
### TOPIC 1: BIG NUMBERS

1) 
$$2024^{2} - (2023)(2025)$$
2)  $11111^{2}x^{2} - 888888$ 
 $2024 = m$ 
 $m^{2} - (m-1)(m+1)$ 
 $m^{2} - (m-1)(m+1)$ 
 $m^{2} - (m^{2}-1)$ 
 $m^{2} - (m^{2}-1)$ 
 $m^{2} - m^{2} - 1$ 
 $m^{2} - m^{2} - 1$ 



#### 4) 3 2022 × 2024 × 2026 + 4×2024

mn pq

# TOPIC 2 : SUMS IN PRODUCTS

1) 
$$1+2+3+\cdots+2023+2024$$

2)  $1+2+3+\cdots+2023+2024$ 

2)  $1+2+3+\cdots+2023+2024$ 

2)  $1+2+3+2025$ 

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2)  $1+2+3+2025$ 

2)  $1+2+3+2025$ 

2)  $1+2+3+2025$ 

to note: arithmetic progression 
$$\frac{n(a+e)}{2}$$
 from  $\frac{n(a+e)}{2}$  from  $\frac{n(a+e)}{2}$  from  $\frac{n(a+e)}{2}$  from  $\frac{n(a+e)}{2}$  from  $\frac{n(a+e)}{2}$ 

2) 
$$[+3+5+\cdots+(2n-1)] = \frac{n[H(2n+1)]}{2}$$
 $[-1, 2(2n-1), 2(2n-1)] = \frac{n(2n-1)}{2}$ 
 $[-1, 2(2n-1), 2(2n-1), 2(2n-1), 2(2n-1)] = \frac{n(2n-1)}{2}$ 

$$4 \cdot 1^{2} + 2^{2} + 3^{2} + \dots + n^{2} = \frac{n \cdot (n+n)(2n+1)}{6}$$

$$4 \cdot 1^{3} + 2^{3} + \dots + n^{3} = \left[ \frac{n \cdot (n+1)}{2} \right]^{\frac{1}{2}}$$

$$\begin{array}{lll} (4) & (+2+4+8+\cdots+2^{n}) & = 2 \\ & = (x_{1}+x_{1}+x_{1}+x_{1}+x_{1}+x_{2}+x_{1}+x_{2}+x_{$$

5) 
$$\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{14} + \frac{1}{3} + \cdots = S$$

$$2(\frac{1}{2} + \frac{1}{4} + \frac{1}{6} + \frac{1}{14} + \cdots) = 2S$$

$$= 1 + \frac{2}{4} + \frac{2}{6} + \frac{2}{14} + \frac{2}{32} + \cdots$$

$$= 1 + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{8} + \frac{1}{4} + \cdots = 2S$$

$$S = 2S - S$$

$$= (1 + \frac{1}{4} + \cdots = 1$$

# TELESCOPING SUM/PRODUCTS

$$= (\sqrt{11} + (\sqrt{12} - \sqrt{21}) + (\sqrt{14} - \sqrt{12}) + (\sqrt{14} - \sqrt{14}) + \cdots + (\sqrt{14} + \sqrt{14})$$

$$= (\sqrt{14} + \sqrt{16}) (\sqrt{14} - \sqrt{16}) + (\sqrt{14} - \sqrt{16}) + (\sqrt{14} - \sqrt{16}) + \cdots + (\sqrt{14} + \sqrt{14})$$

$$= (\sqrt{14} + \sqrt{16}) (\sqrt{14} - \sqrt{16}) + (\sqrt{14} - \sqrt{16}) + (\sqrt{14} - \sqrt{16}) + \cdots + (\sqrt{14} + \sqrt{14})$$

$$= (\sqrt{14} + \sqrt{16}) (\sqrt{14} - \sqrt{16}) + (\sqrt{14} - \sqrt{16}) + (\sqrt{14} - \sqrt{16}) + \cdots + (\sqrt{14} + \sqrt{14})$$

$$= (\sqrt{14} + \sqrt{16}) + (\sqrt{14} - \sqrt{16}) + (\sqrt{14} - \sqrt{16}) + \cdots + (\sqrt{14} + \sqrt{14}) + \cdots + (\sqrt{14} + \sqrt{14})$$

$$= (\sqrt{14} + \sqrt{16}) + (\sqrt{14} + \sqrt{14}) + (\sqrt{14} + \sqrt{14}) + \cdots + (\sqrt{14} + \sqrt{14}) + \cdots + (\sqrt{14} + \sqrt{14})$$

$$= (\sqrt{14} + \sqrt{16}) + (\sqrt{14} + \sqrt{14}) + (\sqrt{14} + \sqrt{14}) + \cdots + (\sqrt{14}$$

6) 
$$\left(1+\frac{1}{2}\right)\left(1+\frac{1}{2}\right)\left(1+\frac{1}{4}\right)\cdots\left(1+\frac{1}{2024}\right)$$

$$=\left(\frac{x}{2}\right)\left(\frac{x}{4}\right)\left(\frac{x}{4}\right)\left(\frac{x}{4}\right)\left(\frac{x}{4}\right)\cdots\left(\frac{2024}{2025}\right)\left(\frac{2024}{2025}\right)$$

$$=\frac{2025}{2}$$

$$=\frac{n}{n}+\frac{1}{n}$$

$$=\frac{n+1}{n}$$

8) 
$$\frac{1}{1 \times 2} + \frac{1}{2 \times 3} + \frac{1}{3 \times 4} + \cdots + \frac{1}{2020 \times 2023} + \frac{1}{2023 \times 2023} + \frac{1}{2023 \times 2023} + \frac{1}{2023 \times 2024}$$

$$\frac{1}{1} = \frac{1}{1} = \frac{1}{12}$$

$$\frac{1}{1} = \frac{1}{1} = \frac{1}{1} = \frac{1}{1} = \frac{1}{1}$$

$$\frac{1}{1 \times 2} = \frac{1}{1} = \frac{1}{1} = \frac{1}{2}$$

$$\frac{1}{1 \times 2} = \frac{1}{1} = \frac{1}{2} = \frac{1}{3}$$

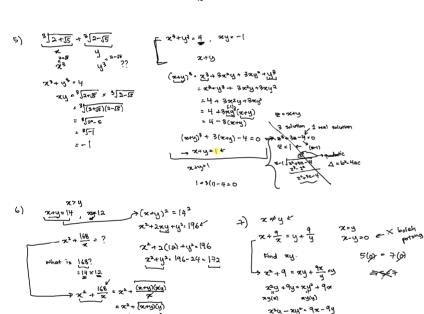
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$$\frac{1}{1 \times 2} = \frac{1}{1} = \frac{1}{3} = \frac{1$$

# TOPIC 3: ALGEBRAIC MANIPULATION

- و . ج -> add / subtract a=2, b=4, a:? -> multiply - vaise poner 9 = 9×6 = 2×4=8 (e.g. square) 3) [43x-77y=45], find 299x-161y. 2) \frac{a}{1+a} + \frac{b}{1+b} + \frac{c}{1+c} = 1 1) xy=2, x+y=4 143-x -774 \_ 451 22-442=? Find ita + 1+6+ 1+c. (x+y)= 42=16 :. 13x - 7y=41 ( 1+0 + 1+6 + 1+c) + ( 1+0 + 1+6+1+c) 22+42+27cy=16  $= \frac{a+1}{1+a} + \frac{b+1}{1+b} + \frac{c+1}{1+c}$ 299x-161y=23(13x-7y)=23(41) 22+42-16-224 = (+)+1 943 = 16-2(2) = 16- 4 (+ 110 +1 +1 = 3 =12 : + tra+ the = 2 4) x+==5
  - 6) 23+ 23 0) 22+ 1/2  $(x+\frac{1}{x})^3 = 5^3 = 125$  $(x+\frac{1}{2})^2=5^2=25$  $\chi^{3} + 3\chi^{2}(\frac{1}{x}) + 3\chi(\frac{1}{x})^{2} + \frac{1}{x^{3}} = 125$ マン+ 2又(支)+(支)2=25 22+2+ 1 = 25 ス3+3×+3(大)+大:125 724 - 1 = 23. 1  $x^3 + 3\left[x + \frac{1}{x}\right] + \frac{1}{x^3} = 125$ 24+2x2(x2)+1=24:232 x3+3(5)+1=125 xu+ 1/24 = 232-2



= x2+ x4+4°

= 22747-12

= 172+12 - 184

x2y-xy2: 9x-9y

24(2-4)=9(2-4)

xy=9

x-y+0

# TOPIC 4: Trivial INEQUALITY

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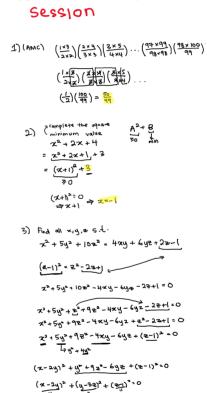
$$2^{4} = 6$$

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### PROBLEM - SOLVING Session

=> x-22=0



2=24=6