تخلفات 2023

First Question :-

(1) True

if $x \in \mathbb{Z}$ $\lfloor 2 \rfloor = 2$ $\quad \therefore \lfloor x \rfloor - \lceil x \rceil = 0$

$\lceil 2 \rceil = 2$

if $x \notin \mathbb{Z}$ $\lceil 1.5 \rceil = 2$ $\quad \lceil x \rceil - \lfloor x \rfloor = 1$

$\lfloor 1.5 \rfloor = 1$

(2) True

(3) False $\Rightarrow$ Theorem :- if $x \bmod y = r$, then y divides $x - r$

(4) False

ضرب $J! = J(J-1)(J-2)\dots 3\times 2\times 1$ $\neq$

جمع $\sum_{x=1}^{J} = 1+2+3+\dots+(J-2)+(J-1)+J$

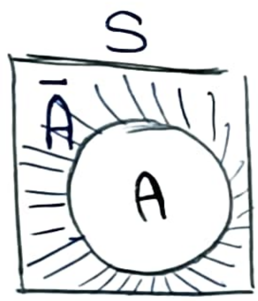
نفس العناصر ولكن مره مضروبين

ومره مجموعين عشان كده مش متساويين

(5) مش عليكوا

(6) False

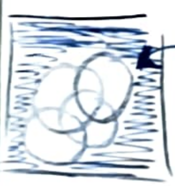
لان العنصر بينتمي لل S



(7) True

(8) مش عليكوا

(9) False



$\overline{\bigcup A_n}$

$\bigcup_{n=1}^{N} A_n$ اتحاد مجموعه من العناصر ، متممتهم ايه يبقى؟ الجزء اللي بره

والعناصر اللي برة دي $\leftarrow$ $x \notin A_n$

(10) True

Second Question

(11) (b)

$n! = n(n-1)(n-2)\ \cdots 3\times 2\times 1$

$\prod_{j=1}^{n} j = 1\times 2\times 3\times \cdots (n-2)(n-1)\,n$

شبه علامة ال ($\sum$ Sum) ولكن
الاختلاف بدل ماتجمع العناصر هنضربهم

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(12) (a)

$S_n = \{n^2k^2 \mid k = 1,2\}$

$\bigcup_{n=2}^{3} S_n = S_2 \cup S_3$

$S_2 = \{4k^2 \mid k = 1,2\}$

$= \{4, 16\} \Rightarrow (\mathrm{I})$

$S_3 = \{9k^2 \mid k = 1,2\}$

$= \{9, 36\} \Rightarrow (\mathrm{II})$

$\mathrm{I} \cup \mathrm{II} = \{4, 16, 9, 36\}$

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(13) onto

$\mathbb{Z} \rightarrow \{0, 1, \cdots\}$

hash $h(x) = x \bmod 11$

$= 0 \bmod 11$

$1 \bmod 11 = 1$

$2 \bmod 11 = 2$

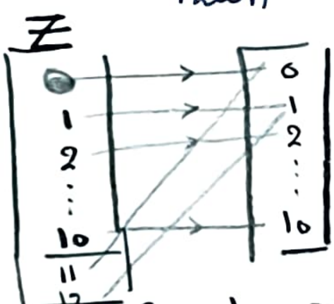
$\vdots$

$10 \bmod 11 = 1$

$11 \bmod 11 = 0$

$12 \bmod 11 = 1$

$\vdots$



not one-to-one

✓ onto

(14) $\frac{n}{n+1}$

(15) R

(16) symmetric

$R \cup R^{-1}$ $(a,b) \in R \Rightarrow (b,a) \in R$

(17) R

(18) (-1)

$-3\,h(210) + 12 \bmod 5$

$\rightarrow h(210) = 210 \bmod 11 = 1$

$\rightarrow 12 \bmod 5 = 2$

$-3(1) + (2) = -1$

(19) 2

بنحسبوا ازاى ؟

$F_n = F_{n-1} + F_{n-2}$

$n-0 \quad n-1 \quad n-2$

أكبر رقم مطروح من n هو كام ؟

$\leftarrow 2$

∴ الرتبة بتاعتنا 2

(20) مش عليكوا

$\Rightarrow P^6_2 = \frac{6!}{2!(6-2)!} = \frac{6!}{4!\,2!}$

$= \frac{\cancel{6}^{3} \times 5 \times \cancel{4!}}{\cancel{4!}\,\cancel{2!}} = 15$

Third Question :-

① خطأ

② $$f(x) = \begin{cases} 3 & 0 < t \leq 2 \\ t & 2 < t \leq 3 \\ -t & 3 < t \leq 5 \end{cases}$$

$$3\left[u(t-0) - u(t-2)\right] +$$

$$t\left[u(t-2) - u(t-3)\right] +$$

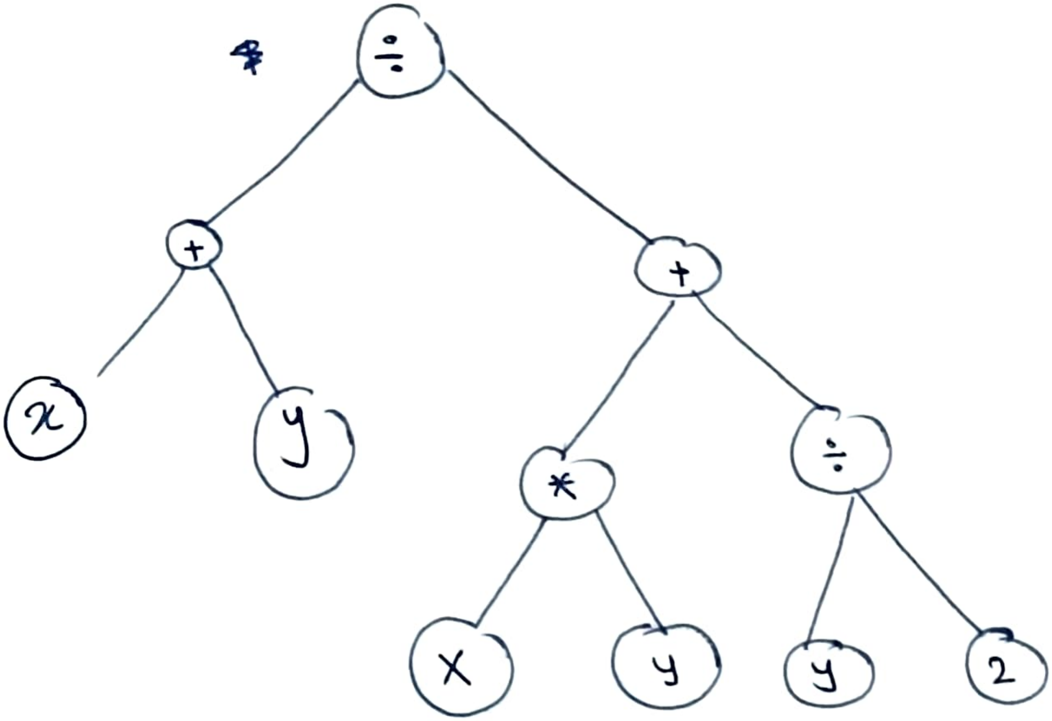
$$-t\left[u(t-3) - u(t-5)\right]$$

$$= 3u(t) + u(t-2)\left[t - 3\right] \mp u(t-3)\left[t + t\right] + t\,u(t-5)$$

$$= 3u(t) + (t-3)u(t-2) - 2t\,u(t-3) + t\,u(t-5) \quad \#$$

$\boxed{3}$

$$(x+y) \div \left((x \times y) + (y \div 2) \right)$$



Fourth Question

$$f(x) = f(0) + \frac{x}{1!} f'(0) + \frac{x^2}{2!} f''(0) + \frac{x^3}{3!} f'''(0) + \frac{x^4}{4!} f^{(4)}(0) + \cdots$$

$$f(x) = \sin x + e^{2x}$$

$$f(x) = \sin x + e^{2x} \longrightarrow f(0) = \cancel{\sin 0} + e^{0} = 1$$

$$f'(x) = \cos x + 2e^{2x} \longrightarrow f'(0) = 1 + 2e^{0} = 3$$

$$f''(x) = -\sin x + 4e^{2x} \longrightarrow f''(0) = 4$$

$$f'''(x) = -\cos x + 8e^{2x} \longrightarrow f'''(0) = -1 + 8e^{0} = 7$$

$$\therefore \sin x + e^{2x} = 1 + x(3) + \frac{x^2}{2!}(4) + \frac{x^3}{3!}(7) + \cdots$$

$$= \underbrace{1}_{1} + \underbrace{3x}_{2} + \underbrace{2x^2}_{3} + \underbrace{\frac{7}{3!}x^3}_{4} + \cdots$$

دول اول 4 حدود زي ما هو طالب

(2) $\sum_{j=1}^{n} a_{j+1} \longrightarrow k=0$

$j = k+1$

$$\sum_{k+1=1}^{k+1=n} a_{(k+1)+1} = \sum_{k=0}^{k=n-1} a_{k+2} \quad \#$$

$\boxed{3}$

$$A = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \end{array} \begin{array}{c} \begin{array}{cccc} 1 & 2 & 3 & 4 \end{array} \\ \begin{bmatrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 2 \\ 1 & 0 & 1 & 0 \end{bmatrix} \end{array}$$

$$L = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \end{array} \begin{array}{c} \begin{array}{cccc} 1 & 2 & 3 & 4 \end{array} \\ \begin{bmatrix} 2 & -1 & 0 & -1 \\ -1 & 2 & -1 & 0 \\ 0 & -1 & 2 & -1 \\ -1 & 0 & -1 & 2 \end{bmatrix} \end{array}$$

$$I = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \end{array} \begin{array}{c} \begin{array}{cccc} e_1 & e_2 & e_3 & e_4 \end{array} \\ \begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 \end{bmatrix} \end{array}$$

(b) dege of each vertex

$deg(1) = deg(2) = deg(3) = deg(4) = 2$