Q1 Number of 7 digit odd numbers formed using seven digits 1, 2, 2, 2, 3, 3, 5

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Q2 if $|a| = 1$ $|b| = 2$ $\bar{a}\cdot\bar{b} = 4$ $\bar{c} = 2(\bar{a}\times\bar{b}) - 3\bar{b}$ then find $\bar{b}\cdot\bar{c} =$

-12

Q3 50^{th} root of x is 12 & 50^{th} root of y is 18 then remainder when $(x+y)$ is divided by 25

Q4 let $P' = aP + (a-1)I$ $a \in R$ $a > 1$ & P is a square matrix of order 3 then

(a) $|\text{adj } P| = 1$ (b) $|\text{adj} P| < 1$

(c) $|\text{adj } P| = 2$ (d) P is singular

Q5 if $a_1\ a_2 \ldots a_{100}$ are 100 consecutive natural numbers such that mean deviation about mean is 25 then find set S containing all such a_i

Q6 Common tangent is drawn to $y^2 = 16x$ & $x^2 + y^2 = 8$ find square of distance b/w point of contact of common tangent to both the curves.

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Q7 if $f(x) = \begin{cases} \dfrac{x}{|x|} & x \neq 0 \\ 1 & x = 0 \end{cases}$ & $g(x) = \begin{cases} \dfrac{\sin(x+1)}{x+1} & x \neq -1 \\ 1 & x = -1 \end{cases}$

& $h(x) = 2[x] + f(x)$ then $\lim\limits_{x \to 1} g(h(x-1))$

Q8 $\lim_{n\to\infty} \frac{3}{n}\left[4+\left(2+\frac{1}{n}\right)^2+\left(2+\frac{2}{n}\right)^2+\cdots\left(3-\frac{1}{n}\right)^2\right]$

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Q9 Two AP's are given as follows 3, 7, 11 ... & 1, 6, 11, 16 ... Then the 8^{th} common term that is appearing in both the series is

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Q10 Three points (1,0,2) (1,k,−1) & (2,1,k) lies on a plane whose normal vector is perpendicular to the line $\frac{x-1}{1}=\frac{y+1/2}{1}=\frac{z+1}{1}$ then value of $k \neq 0$

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Q11 let $f(x)=\sqrt{3-x}+\sqrt{x+2}$ then $f(x)$ has a range

$\sqrt{5}, \sqrt{10}$

Q12 The value of $\tan^{-1}\left(\frac{1}{1+a_1a_2}\right)+\tan^{-1}\left(\frac{1}{1+a_2a_3}\right)+\cdots$ $\tan^{-1}\left(\frac{1}{1+a_{2021}a_{2022}}\right)$ if $a_1=1$ & a_i are consecutive natural nos.

$\frac{\pi}{4}-\cot^{-1}2022$

Q13 let p: I am well

q: I will not take rest

r: I will not sleep properly

then " If I am not well then I will not take rest and I will not sleep properly" is logically equivalent to

$\sim p \to (q \wedge r)$

Q14 q is maximum value of P lying in the interval $[0,10]$ roots of $x^2 - Px + \frac{5P}{4} = 0$ are having rational roots. find the area of region $S: \{0 \le y \le (x-q)^2$

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Q15 let $P = (8\sqrt{2}+13)^{13}$ $Q = (6\sqrt{2}+9)^9$ then

(a) $[P]$ = odd $[Q]$ = even
(b) $[P]$ = even $[Q]$ = odd
(c) $[P]$ = odd $[Q]$ = odd
(d) $[P] + [Q]$ = even

Q16 if $\frac{dy}{dx} = -\frac{3x^2+y^2}{3y^2+x^2}$ $y(1)=0$ then $f(x)$

$(3y^2 - 2xy + 3x^2)(x+y)^2 = 3$

Q17 $A = \{2,4,6,8,10\}$ Then the total number of functions defined on A such that $F(m \cdot n) = F(m) \cdot F(n)$ $m, n \in A$ are

Q18 if the area of the region bounded by the curves $y = x^2$ $y = (1-x)^2$ & $y = 2x(1-x)$ is A then the value of 540A

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Q19 let $a = \{1,3,5 \ldots 99\}$ & $b = \{2,4,6 \ldots 100\}$ The number of ordered pairs (a,b) such that $a+b$ when divided by 23 leaves remainder by 23 leaves remainder 2 is

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Q20 if $y=1$ satisfy both the quadratic equations & both the equation have one common root the equation are as follows. if a, b, c are in G.P then

$$ax^2 + 2bx + cy = 0$$
$$dx^2 + 2ex + fy = 0$$

(a) d, e, f in GP

(b) d, e, f in AP

✓(c) $\frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ in AP

(d) $\frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ in G.P

Q21 If $f(x) = \frac{x^3}{3} + \frac{ax^2}{2} + 2bx$ & $g(x) = \frac{x^3}{3} + bx^2 + ax$ have common point of extremum find $2b+a+7$ (6)