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Shift-2

EE24BTECH11063 - Y.Harsha Vardhan Reddy

Integer Type

1) Let R_1 and R_2 be relations on the set $\{1, 2, \cdots, 50\}$ such that $R_1 = \{(p, p^n) : p$ is a prime and $n \geq 0$is an integer$\}$ and $R_2 = \{(p, p^n) : p$ is a prime and $n = 0$ or $1\}$. Then, the number of elements in $R_1 - R_2$ is

2) The number of real solutions of the equation $e^{4x} + 4e^{3x} - 58e^{2x} + 4e^x + 1 = 0$ is

3) The mean and standard deviation of 15 observations are found to be 8 and 3, respectively. On rechecking, it was found that, in the observations, 20 was misread as 5. Then, the correct value of variance is equal to

4) If

$$\vec{a} = 2\hat{i} + \hat{j} + 3\hat{k}, \vec{b} = 3\hat{i} + 3\hat{j} + \hat{k} \text{ and } \vec{c} = c_1\hat{i} + c_2\hat{j} + c_3\hat{k}$$

are coplanar vectors and

$$\vec{a} \cdot \vec{c} = 5, \vec{b} \perp \vec{c}$$

then $122\,(c_1 + c_2 + c_3)$ is equal to

5) A ray of light passing through the point $P\ (2, 3)$ reflects on the x-axis at point A and the reflected ray passes through the point $Q\ (5, 4)$. Let R be the point that divides the line segment AQ internally into the ratio $2\ :\ 1$. Let the co-ordinates of the foot of the perpendicular M from R on the bisector of the angle PAQ be (α, β). Then, the value of $7\alpha + 3\beta$ is equal to

6) Let l be a line which is normal to the curve $y = 2x^2 + x + 2$ at a point P on the curve. If the point $Q\ (6, 4)$ lies on the line l and O is the origin, then the area of the triangle OPQ is equal to

7) Let $A = 1, a_1, a_2, \cdots a_{18}, 77$ be a set of integers with $1 < a_1 < a_2 < \cdots < a_{18} < 77$. Let the set $A\,A = x + y : x, y \in A$ contain exactly 39 elements. Then, the value of $a_1 + a_2 + \cdots + a_{18}$ is equal to

8) The number of positive integers k such that the constant term in the binomial expansion of

$$\left(2x^3 + \frac{3}{x^k}\right)^{12},\ x \neq 0$$

is $2^8 \cdot I$, where I is an odd integer, is

9) The number of elements in the set

$$\{z = a + ib \in C\ :\ a, b \in Z \text{ and } 1 < |z - 3 + 2i| < 4\}$$

is

10) Let the lines

$$y + 2x = \sqrt{11} + 7\sqrt{7} \text{ and } 2y + x = 2\sqrt{11} + 6\sqrt{7}$$

be normal to a circle $C : (x-h)^2 + (y-k)^2 = r^2$. If the line $\sqrt{11}y - 3x = \frac{5\sqrt{17}}{3} + 11$ is tangent to the circle C, then the value of $(5h - 8k)^2 + 5r^2$ is equal to