Assignment 1
2022-June
Session-06-27-2022-shift-1:16-30

EE24BTECH11049

Patnam Shariq Faraz Muhammed

MCQ

1) Five numbers x_1, x_2, x_3, x_4, x_5 are randomly selected from the numbers $1, 2, 3, \ldots, 18$ and are arranged in the increasing order ($x_1 < x_2 < x_3 < x_4 < x_5$). The probability that $x_2 = 7$ and $x_4 = 11$ is:

(2022-Jun-27-S1)

   a) $\frac{1}{136}$ b) $\frac{1}{72}$ c) $\frac{1}{68}$ d) $\frac{1}{34}$

2) Let X be a random variable having binomial distribution $\mathbf{B}(7, p)$. If $\mathbf{P}(X = 3) = 5\mathbf{P}(X = 4)$, then the sum of the mean and the variance of X is:

(2022-Jun-27-S1)

   a) $\frac{105}{16}$ b) $\frac{7}{16}$ c) $\frac{77}{36}$ d) $\frac{49}{16}$

3) The value of

$$\cos\left(\frac{2\pi}{7}\right) + \cos\left(\frac{4\pi}{7}\right) + \cos\left(\frac{6\pi}{7}\right)$$

   is equal to;

(2022-Jun-27-S1)

   a) -1 b) $-\frac{1}{2}$ c) $-\frac{1}{3}$ d) $-\frac{1}{4}$

4)

$$\sin^{-1}\left(\sin\frac{2\pi}{3}\right) + \cos^{-1}\left(\cos\frac{7\pi}{6}\right) + \tan^{-1}\left(\tan\frac{3\pi}{4}\right)$$

   is equal to;

(2022-Jun-27-S1)

a) $\frac{11\pi}{12}$ b) $\frac{17\pi}{12}$ c) $\frac{31\pi}{12}$ d) $-\frac{3\pi}{4}$

5) The boolean expression $(\sim (p \wedge q)) \vee q$ is equivalent to:

(2022-Jun-27-S1)

a) $q \to (p \wedge q)$ c) $p \to (p \to q)$
b) $p \to q$ d) $p \to (p \vee q)$

INTEGER

1) let $f : \mathbf{R} \mapsto \mathbf{R}$ be a function defined by

$$f(x) = \frac{2e^{2x}}{e^{2x} + e^x} \text{ then } f\left(\frac{1}{100}\right) + f\left(\frac{2}{100}\right) + f\left(\frac{3}{100}\right) + \cdots + f\left(\frac{99}{100}\right)$$

is equal to _____

(2022-Jun-27-S1)

2) If the sum of all the roots of the equation

$$e^{2x} - 11e^x - 45e^{-x} + \frac{81}{2} = 0$$

is $\log_e p$, then p is equal to _____

(2022-Jun-27-S1)

3) The positive value of the determinant of the matrix A, whose

$$adj(adj(A)) = \begin{pmatrix} 14 & 28 & -14 \\ -14 & 14 & 28 \\ 28 & -14 & 14 \end{pmatrix},$$

is _____

(2022-Jun-27-S1)

4) The number of ways, 16 identical cubes, of which 11 are blue and rest are red, can be placed in a row so that between any two red cubes there should be at least 2 blue cubes, is _____

(2022-Jun-27-S1)

5) If the coefficient of x^{10} in the binomial expansion of

$$\left(\frac{\sqrt{x}}{5^{\frac{1}{4}}} + \frac{\sqrt{5}}{x^{\frac{1}{3}}}\right)$$

is $5^k l$ where $l, k \in \mathbf{N}$ and l is co-prime to 5, then k is equal to _____

(2022-Jun-27-S1)

6)

$$A_1 = \left\{(x, y) : |x| \le y^2, |x| + 2y \le 8\right\} \text{ and } A_2 = \{(x, y) : |x| + |y| \le k\}.$$

if $27(AreaA_1) = 5(AreaA_2)$, then k is equal to: _____

(2022-Jun-27-S1)

7) If the sum of the first ten terms of the series

$$\frac{1}{5} + \frac{2}{65} + \frac{3}{325} + \frac{4}{1025} + \frac{5}{2501} + \ldots \text{ is } \frac{m}{n},$$

where m and n are co-prime numbers, then $m + n$ is equal to _____

(2022-Jun-27-S1)

8) A rectangle R with end points of one of its sides as $(1, 2)$ and $(3, 6)$ s inscribed in a circle. If the equation of a diameter of the circle is $2x - y + 4 = 0$, then the area of R is _____

(2022-Jun-27-S1)

9) A circle of radius 2 unit passes through the vertex and the focus of the parabola $y^2 = 2x$ and touches the parabola $y = \left(x - \frac{1}{4}\right)^2 + \alpha$ where $\alpha > 0$. Then $(4\alpha - 8)^2$ is equal to _____

(2022-Jun-27-S1)

10) Let the mirror image of the point (a, b, c) with respect to the plane $3x - 4y + 12z + 19 = 0$ be $(\alpha - 6, \beta, \gamma)$. if $a + b + c = 5$, then $7\beta - 9\gamma$ is equal to _____

(2022-Jun-27-S1)