MATHS

BOOKS - KVPY PREVIOUS YEAR

MOCK TEST 4

Exercise

1. If x and y co-ordinates of any point P are chosen randomly from intervals $[0, 2]$ and $[0, 1]$ respectively, then the probability $y \leq x^2$ is (A) $\frac{1}{2}$ (B) $\frac{2}{3}$ (C) $\frac{3}{4}$ (D) $\frac{1}{4}$

A. $\frac{1}{2}$

B. $\frac{2}{3}$

C. $\frac{3}{4}$

D. $\frac{1}{4}$

Answer:

Watch Video Solution

2. Which of the following result is valid?

A. $(1+x)^n > (1+nx)$,for all natural numbers n

B. $(1+x)^n \geq (1+nx)$,for all numbers n,where $x > -1$

C. $(1+x)^n \leq (1+nx)$,for all natural numbers n

D. $(1+x)^n < (1+nx)$,for all natural numbers n

Answer:

Watch Video Solution

3. Consider a circle with its centre lying on the focus of the parabola, $y^2 = 2px$ such that it touches the directrix of the parabola. Then a point of intersection of the circle & the parabola is:

A. $\left(\frac{p}{2}, p\right)$

B. (2p,2p)

C. $\left(-\frac{p}{2}, p\right)$

D. $\left(-\frac{p}{8}, \frac{p}{2}\right)$

Answer:

Watch Video Solution

4. A circle is given by $x^2 + (y-1)^2 = 1$, another circle C touches it externally and also the x-axis, then the locus of center is:

A. $\{(x, y) : x^2 = 4y\} \cup \{(x, y) : y \leq 0\}$

B. $\left\{(x, y) : x^2 + (y-1)^2 = 4\right\} \cup \{(x, y) : y \leq 0\}$

C. $\{(x, y) : x^2 = y\} \cup \{(0, y) : y \leq 0\}$

D. $\{(x, y) : x^2 = 4y\} \cup \{(0, y) : y \leq 0\}$

Answer:

Watch Video Solution

5. If p, q, r are any real numbers, then (A) $\max(p, q) < \max(p, q, r)$ (B) $\min(p, q) = \frac{1}{2}(p + q - |p - q|)$(C) $\max(p, q) < \min(p, q, r)$ (D) None of these

A. max(p,q)ltmax(p,q,r)

B. min(p,q)=$\frac{1}{2}(p + q - |p - q|)$

C. max(p,q)ltmin(p,q,r)

D. none of these

Answer:

Watch Video Solution

6. If $(\log)_2(a+b)+(\log)_2(c+d)\geq 4.$ Then find the minimum value of the expression $a+b+c+\cdot\cdot$

A. 2

B. 4

C. 8

D. 16

Answer:

Watch Video Solution

7. If r_1 and r_2 are the distances of points on the curve $10(Z\overline{Z}) - 3i\left(Z^2 - (\overline{Z})^2\right) - 16 = 0$ which are at maximum and minimum distance from the origin then the value of $r_1 + r_2$

A. 4

B. 3

C. 2

D. None of these

Answer:

Watch Video Solution

8. Let f be a real valued function satisfying f(x)+f(x+6)=f(x+3)+f(x+9).Then $\int_{x}^{x+12} f(t)dt$is

A. a linear function of x

B. an exponential function of x

C. a constant function

D. None of these

Answer:

Watch Video Solution

9. If $a_n = \sqrt{7 + \sqrt{7 + \sqrt{7} + \ldots\ldots}})$ having n radical signs then by methods of mathematical induction which is true

A. $a_n > 7 \forall n \geq 1$

B. $a_n < 7 \forall n \geq 1$

C. $a_n < 4 \forall n \geq 1$

D. $a_n > 3 \forall n \geq 1$

Answer:

Watch Video Solution

10. Let $\sum_{r=1}^{n} \left(r^4\right) = f(n)$. Then $\sum_{r=1}^{n} (2r-1)^4$ is equal to :

A. f(2n)-16f(n)for all $n \in N$

B. $f(n) - 16f - \left(\frac{n-1}{2}\right)$ when n is odd

C. f(n)-16f(n/2) when n is even

D. None of these

Answer:

Watch Video Solution

11. A hat contains a number of cards with 30% white on both sides, 50% black on one side and whit e on the other side, 20% black on both sides. The cards are mixed up, and a single card is drawn at random and placed on the table. Its upper side shows up black. The probability that its other side is also black is $2/9$ b. $4/9$ c. $2/3$ d. $2/7$

A. $\frac{2}{9}$

B. `4/9

C. $\frac{2}{3}$

D. $\frac{2}{7}$

Answer:

Watch Video Solution

12. If x is real, then the maximum value of $y = 2(a-x)\left(x+\sqrt{x^2+b^2}\right)$

A. a^2+b^2

B. a^2-b^2

C. $a^2 + 2b^2$

D. None of these

Answer:

Watch Video Solution

13. The minimum value of $px + py$ when $xy = r^2$ is equal to

A. $2r\sqrt{pq}$

B. $2pq\sqrt{r}$

C. $-2r\sqrt{pq}$

D. $\sqrt{pq}$

Answer:

Watch Video Solution

14. Let z_1, z_2 be two complex numbers represented by points on the circle|z| =1 and |z|=2 respectively,then which of the following is incorrect

A. max $|2z_1 + z_2| = 4$

B. min|z_1-z_2|=1

C. $\left|z_2 + \frac{1}{z_1}\right| \leq 3$

D. None of these

Answer:

Watch Video Solution

15. Let A be a set consisting of n elements. The probability of selecting two subsets P and Q of set A such that $Q = \overline{P}$, is

A. $1/2$

B. $1/\left(2^k - 1\right)$

C. $1/2^k$

D. $1/3^k$

Answer:

Watch Video Solution

16. If p, q, r are positive and are in A.P., the roots of quadratic equation $px^2 + qx + r = 0$ are all real for $\left|\frac{r}{p} - 7\right| \geq 4\sqrt{3}$ b. $\left|\frac{p}{r} - 7\right| \geq 4\sqrt{3}$ c. $allpandr$ d. $nopandr$

A. $\left|\frac{r}{p} - 7\right| \geq 4\sqrt{3}$

B. $\left|\frac{p}{r} - 7\right| < 4\sqrt{3}$

C. all p and r

D. no p and r

Answer:

Watch Video Solution

17. The general solution of the trigonometric equation $\sin x + \cos x = 1$ is given by

A. $x = 2n\pi, n = 0, \pm 1, \pm 2....$

B. $x = 2n\pi + \pi/2, n = 0, \pm 1, \pm 2....$

C. $x = n\pi + (-1)^n \left(\frac{\pi}{4} - \frac{\pi}{4}\right) n = 0, \pm 1, \pm 2$

D. None of these

Answer:

Watch Video Solution

18. Let $p = \begin{bmatrix} 3 & -1 & -2 \\ 2 & 0 & \alpha \\ 3 & -5 & 0 \end{bmatrix}$, where $\alpha \in \mathbb{R}$. Suppose $Q = [q_{ij}]$ is a matrix such that $PQ = kl$, where $k \in \mathbb{R}, k \neq 0$ and l is the identity matrix of order 3. If $q_{23} = -\frac{k}{8}$ and $\det(Q) = \frac{k^2}{2}$, then

A. a=0,k=8

B. 4a-k+8=0

C. $\det(PadjQ)2^9(d)$

D. $\det(QadjP) = 2^9$

Answer:

Watch Video Solution

19. The total number of distinct $x \in (0, 1]$ for which

$$\int_0^x \frac{t^2}{1+t^4} dt = 2x - 1 \text{ is}$$

A. 0

B. 1

C. 2

D. 3

Answer:

Watch Video Solution

20. $P(a, b)$ is a point in the first quadrant Circles are drawn through P touching the coordinate axes such that the length of common chord of these circles is maximum, if possible values of $\frac{a}{b}$ is k_1 and k_2, then $k_1 + k_2$ is equal to

A. $3 \pm 3\sqrt{2}$

B. $3 + 2\sqrt{3}$

C. $3 - 2\sqrt{3}$

D. $3 \pm 2\sqrt{2}$

Answer:

Watch Video Solution

21. Given that n is odd, number of ways in which three numbers in AP can be selected from 1, 2, 3,........, n, is

A. $\frac{(n-1)^2}{2}$

B. $\frac{(n+1)^2}{2}$

C. $\frac{n^2-1}{4}$

D. $\frac{(n-1)^2}{4}$

Answer:

Watch Video Solution

22. A certain polynomial $P(x)x \in R$ when divided by k $x-a, x-bandx-c$ leaves remainders$a, b, andc$, resepectively. Then find remainder when $P(x)$ is divided by $(x-a)(x-b)(x-c)whereab, c$ are distinct.

A. 0

B. x

C. ax+b-c

D. $ax^2 + bx + c$

Answer:

Watch Video Solution

23. The point of intersection of two tangents to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, the product of whose slopes is c^2, lies on the curve

A. $y^2 - b^2 = c^2(x^2 + a^2)$

B. $y^2 + a^2 = c^2(x^2 - b^2)$

C. $y^2 + b^2 = c^2(x^2 - a^2)$

D. $y^2 - a^2 = c^2(x^2 + b^2)$

Answer:

Watch Video Solution

24. If

$f(x+y) = f(x) + f(y) - xy - 1 \forall x, y \in R and f(1) = 1,$

then the number of solution of $f(n) = n, n \in N,$ is 0

(b) 1 (c) 2 (d) more than 2

A. 0

B. 1

C. 2

D. more than 2

Answer:

Watch Video Solution

25. The area of the region bounded by the curves $y = |x - 1|$ and $y = 3 - |x|$ is (A) 6 sq. units (B) 2 sq. units (C) 3 sq. units (D) 4 sq. units

A. 6 sq.units

B. 2 sq.units

C. 3 sq.units

D. 4 sq.units

Answer:

Watch Video Solution