MATHS

BOOKS - KVPY PREVIOUS YEAR

MOCK TEST 3

Exercise

1. Find the values of α for which the point $(\alpha - 1, \alpha + 1)$ lies in the larger segment of the circle $x^2 + y^2 - x - y - 6 = 0$ made by the chord whose equation is $x + y - 2 = 0$

A. 0

B. 1

C. 2

D. None of these

Answer:

Watch Video Solution

2. Let $1 \leq m < n \leq p$. The number of subsets o the set $A = \{1, 2, 3, \ldots P\}$ having m, n as the least and the greatest elements respectively, is

A. $2^{n-m-1} - 1$

B. 2^{n-m-1}

C. 2^{n-m}

D. None of these

Answer:

Watch Video Solution

3. Let $f: R\overrightarrow{R}$ be a continuous function which satisfies $f(x) = \int_0^x f(t)dt \cdot$ Then the value of $f(1n5)$ is_____

A. -2

B. 3

C. -1

D. 0

Answer:

Watch Video Solution

4. Two numbers a and b are chosen at random from the set {1,2,3,..,3n}. The probability that $a^2 + b^2$ is divisible by 3, is

A. $\frac{1}{3}$

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

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

D. $\frac{n-1}{3n}$

Answer:

Watch Video Solution

5. The line $2px + y\sqrt{1-p^2} = 1(|p| < 1)$ for different values of p, touches a fixed ellipse whose exes are the coordinate axes. Q. The locus of the point of intersection of prependicular tangents of the ellipse is

A. An ellipse of eccentricity $\frac{2}{\sqrt{3}}$

B. An ellipse of eccentricity $\frac{\sqrt{3}}{2}$

C. Hyperbola of eccentricity 2

D. a hyperbola eccentricity $\sqrt{2}$

Answer:

Watch Video Solution

6. If $f: R \to R, g, R \to R$ be two funcitons, and $h(x) = 2\min\{f(x) - g(x), 0\}$ then $h(x) =$

A. f(x)+g(x)-|g(x)-f(x)|

B. f(x)+g(x)+|g(x)-f(x)|

C. f(x)-g(x)+|g(x)-f(x)|

D. f(x)-g(x)-|g(x)-f(x)|

Answer:

Watch Video Solution

7. The area bounded by the curves $y = |x| - 1 and y = -|x| + 1$ is 1 b. 2 c. $2\sqrt{2}$ d. 4

A. 1

B. 2

C. $2\sqrt{2}$

D. 4

Answer:

Watch Video Solution

8. A function $\phi(x)$ satisfies the functional equation $x^2\phi(x) + \phi(1-x) = 2x - x^4$ for all real x. Then $\phi(x)$ is given by

A. x^2

B. $1 - x^2$

C. $1 + x^2$

D. $x^2 + x + 1$

Answer:

Watch Video Solution

9. If n is a natural number,then

A. $1^2 + 2^2 + ... + n^2 < \frac{n^3}{3}$

B. $1^2 + 2^2 + ... + n^2 = \frac{n^3}{3}$

C. $1^2 + 2^2 + ... + n^2 > n^3$

D. $1^2 + 2^2 + ... + n^2 > \frac{n^3}{3}$

Answer:

Watch Video Solution

10. Let

$$S_n = \sum_{k=1}^{n} \frac{n}{n^2 + nk + k^2} \text{ and } T_n = \sum_{k=0}^{n-1} \frac{n}{n^2 + nk + k^2}$$

for $n = 1, 1, 2, 3\ldots,$ they

A. $S_n < \frac{\pi}{3\sqrt{3}}$

B. $S_n > \frac{\pi}{3\sqrt{3}}$

C. $T_n < \frac{\pi}{3\sqrt{3}}$

D. $T_n \geq \frac{\pi}{3\sqrt{3}}$

Answer:

Watch Video Solution

11. Two friends visit a restaurant randomly during 5 pm to 6 pm . Among the two, whoever comes first waits for 15 min and then leaves. The probability that they meet is :

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

B. $\frac{1}{16}$

C. $\frac{7}{16}$

D. $\frac{9}{16}$

Answer:

Watch Video Solution

12. For any $n \in N$, the value of the expression $\sqrt{2+\sqrt{2+\sqrt{2+\ldots\ldots\ldots n \times}}}$ is

A. $2\cos\left(\frac{\pi}{2^{n+1}}\right)$

B. $2\sin\left(\frac{\pi}{2^{n+1}}\right)$

C. $\sqrt{2}\cos\left(2^{n+1}\pi\right)$

D. None of these

Answer:

Watch Video Solution

13. If a, b and c are distinct positive numbers, then the expression

$(a+b-c)(b+c-a)(c+a-b)-abc$ is:

A. positive

B. negative

C. non-positive

D. non-negative

Answer:

Watch Video Solution

14. The general value of θ satisfying the equation $2\sin^2\theta - 3\sin\theta - 2 = 0$ is

A. $n\pi + (-1)^n \pi/6$

B. $n\pi + (-1)^n \pi/2$

C. $n\pi + (-1)^n (5\pi)/6$

D. $n\pi + (-1)^n (7\pi)/6$

Answer:

Watch Video Solution

15. For 3×3 matrices M and N, which of the following statement(s) is/are not correct?

A. $N^T MN$ is symmetric or skew symmetric,according as M is symmetric or skew symmetric

B. MN-NM is skew symmetric for all symmetric matrices M and N

C. MN is symmetric for all symmetric matrices M and N

D. None of these

Answer:

Watch Video Solution

16. If the inequality $\left(mx^2+3x+4+2x\right)/\left(x^2+2x+2\right)<5$ is satisfied for all $x \in R,$ then find the value of m.

A. 1ltmlt5

B. -1ltmlt1

C. $-5 < m < \frac{11}{24}$

D. $m < \frac{71}{24}$

Answer:

Watch Video Solution

17. If $f(x) = g\left(x^3\right) + xh\left(x^3\right)$ is divisiblel by $x^2 + x + 1$, then

A. both g(x) and h(x) are divisible by (x-1)

B. h(x) is divisible but g(x) is not divisible x-1

C. g(x) is divisible but h(x) is not divisible x-1

D. None of these

Answer:

Watch Video Solution

18. The area of the trapezium whose vertices lie on the parabola $y^2 = 4x$ and its diagonals pass through (1,0) and having length $\frac{25}{4}$ units each is

A. 75/4

B. 73/4

C. 75/2

D. 70/3

Answer:

Watch Video Solution

19. A person goes to office either by car, scooter, bus or train probability of which being $\frac{1}{7}, \frac{3}{7}, \frac{2}{7}$ and $\frac{1}{7}$ respectively. Probability that he reaches office late, if he takes car, scooter, bus or train is $\frac{2}{9}, \frac{1}{9}, \frac{4}{9}$ and $\frac{1}{9}$ respectively. Given that he reached office in time, then what is the probability that he travelled by a car?

A. $\frac{1}{7}$

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

C. $\frac{6}{7}$

D. $\frac{5}{7}$

Answer:

Watch Video Solution

20. The line $x + y = 1$ meets X-axis at A and Y-axis at B,P is the mid-point of AB, P_1 is the foot ofperpendicular from P to OA, M_1, is that of P_1, from OP; P_2, is that of M_1 from OA, M_2, is that of P_2, from OP; P_3 is that of M_2, from OA and so on. If P_n denotes the nth foot of the perpendicular on OA, then find OP_n.

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

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

C. $\left(\frac{1}{2}\right)^{n+1}$

D. None of these

Answer:

Watch Video Solution

21. If x, y and$z$ are three real numbers such that $x+y+z=4$ and $x^2+y^2+z^2=6$,then show that each of x,y and z lie in the closed interval $\left[\frac{2}{3}, 2\right]$

A. [2/3,2]

B. [0,2/3]

C. [0,2]

D. [-1/3,2/3]

Answer:

Watch Video Solution

22. A variable point P on the ellipse of eccentricity e is joined to the foci S and S'. The eccentricity of the locus of incentre of the triangle PSS' is (A) $\sqrt{\frac{2e}{1+e}}$ (B) $\sqrt{\frac{e}{1+e}}$ (C) $\sqrt{\frac{1-e}{1+e}}$ (D) $\frac{e}{2(1+e)}$

A. 5

B. 2

C. 1

D. -1

Answer:

Watch Video Solution

23. Letz,z_0be two complex numbers $z_0$being the cojugate of z_0. The numbers z, z_0, $z\bar{z}_0$,1 and 0 are represented in argand diagram by P,P_0, Q, A and origin respectively. If $|z| = 1$, then (A) $\triangle POP_0$ and $\triangle AOQ$ are congruent (B) $|z - z_0| = |z\bar{z}_0 - 1|$ (C) $|z - z_0| = \frac{1}{2}|z\bar{z}_0 - 1|$ (D)none of these

A. Only I is true

B. Only II is true

C. Both I & II are true

D. Both I & II are false

Answer:

Watch Video Solution

24. A person throws dice, one the common cube and the other reglowest terahedron, the number on the lowest face being taken in the case of a tetrahedron.

The chance that the sum of numbers throws is not less than 5 is

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

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

C. $\frac{4}{5}$

D. $\frac{5}{6}$

Answer:

Watch Video Solution

25. The integers x,y and z each are perfect squares and x>y>z>0.If x,y,z form an A.P. and x+y+z=75, then

the smallest possible value of x is

A. 39

B. 31

C. 41

D. 49

Answer:

Watch Video Solution

26. let $A_1, A_2, A_3, \ldots A_n$ are the vertices of a regular n sided polygon inscribed in a circle of radius R. If

$(A_1A_2)^2 + (A_1A_3)^2 + ... (A_1A_n)^2 = 14R^2$ then find the number of sides in the polygon.

A. 3

B. 4

C. 5

D. None of these

Answer:

Watch Video Solution

27. If p, q, r, s are in A.P.and $f(x) = \begin{vmatrix} p+\sin x & q+\sin x & p-r+\sin x \\ q+\sin x & r+\sin x & -1+\sin x \\ r+\sin x & s+\sin x & s-q+\sin x \end{vmatrix}$ such that $\int_0^2 f(x)dx = -4$ then the common difference of the A.P. can be : (A) 1 (B) 3/2 (C) -1 (D) 3

A. ± 1

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

C. ± 2

D. None of these

Answer:

Watch Video Solution