MATHS

BOOKS - KVPY PREVIOUS YEAR

MOCK TEST 8

Exercise

1. if $A(z_1), B(z_2), C(z_3), D(z_4)$ lies on |z|=4 (taken in order) , where $z_1 + z_2 + z_3 + z_4 = 0$ then :

A. a rectangle

B. a square

C. a rhombus

D. None of these

Answer:

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2. If $\varphi(x)$ is a polynomial function and $\varphi'(x) > \varphi(x) \forall x \geq 1 and \varphi(1) = 0,$ then $\varphi(x) \geq 0 \forall x \geq 1$ `varphi(x)

A. $\phi(x) \geq 0 \forall x \geq 1$

B. $\phi(x) < 0 \forall x \geq 1$

C. $\phi(x) = 0 \forall x \geq 1$

D. None of these

Answer:

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3. Let $(a_1, a_2, a_3, a_4, a_5)$ denote a re-arrangement of $(1, -4, 6, 7, -10)$. Then the equation $a_1x^4 + a_2x^3 + a_3x^2 + a_4x + a_5 = 0$ has at least two real roots.

Statement (2): If $ax^2 + bx + c = 0 \& a + b + c = 0$, (i.e. in a polynomial the sum of coefficients is zero) then x = 1 is root of $ax^2 + bx + c = 0$.

A. at least two real roots

B. all four real roots

C. only imaginary roots

D. none of these

Answer:

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4. The period of the function

$f(x) = \cos 2\pi\{2x\} + \sin 2\pi\{2x\},$

is (where {x} denotes the functional part of x)

A. 1

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

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

D. π

Answer:

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5. Prove that $\sin\theta = x + \frac{p}{x}$ is possible for real x if $p \leq \frac{1}{4}$

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

B. plt0

C. pgt0

D. $p \geq 1$

Answer:

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6. If $\left|\vec{a} + \vec{b}\right| = \left|\vec{a} - \vec{b}\right|$, then which one of the following is correct ?

A. $\vec{a} = \lambda \vec{b}$ for some scalar λ

B. $\vec{a}$ is parallel to $\vec{b}$

C. $\vec{a}$ is perpendicular to $\vec{b}$

D. $\vec{a} = \vec{b} = \vec{0}$

Answer:

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7. A man X has 7 friends, 4 of them are ladies and 3 are men. His wife Y also has 7 friends, 3 of them are ladies and 4 are men. Assume X and Y have no common friends. Then the total number of ways in which X and Y together can throw a party inviting 3 ladies and 3 men, so that 3 friends of each of X and Y are in the party, is : 469 (2) 484 (3) 485 (4) 468

A. 484

B. 485

C. 468

D. 469

Answer:

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8. Given that the sum of two non-negative quantities is 200, the probability that their product is not less than $3/4$ times their greatest product value is

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

B. $\frac{101}{201}$

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

D. $\frac{10}{16}$

Answer:

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9. If $x^2 + ax + b^2 = 0$ has real roots then which of these is a possible ordered pair (a,b) ?

A. (3,1)

B. (6,3)

C. (2,3)

D. None of these

Answer:

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10. If $f(x) = \sin^2 x + \sin^2\left(x + \frac{\pi}{3}\right) + \cos x \cos\left(x + \frac{\pi}{3}\right) and g\left(\frac{5}{4}\right) = 1,$ then $(gof)(x)$ is _____

A. a circle

B. a straight line

C. a parabola

D. none of these

Answer:

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11. The area of the region enclosed by the curve $|y| = -(1-|x|)^2 + 5$, is

A. $\frac{8}{3}(7+5\sqrt{5})$ sq. units

B. $\frac{2}{3}(7+5\sqrt{5})$ sq. units

C. $\frac{2}{3}(5\sqrt{5}-7)$ sq. units

D. None of these

Answer:

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12. If $\left(m_i, \frac{1}{m_i}\right), i = 1, 2, 3, 4$ are four distinct points on a circle, show that $m_1 m_2 m_3 m_4 = 1$

A. 0

B. 2

C. -1

D. 1

Answer:

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13. The line passing through the extremity A of the major exis and extremity B of the minor axis of the ellipse $x^2 + 9y^2 = 9$ meets is auxiliary circle at the point M. Then the area of the triangle with vertices at $A, M,$ and O (the origin) is 31/10 (b) 29/10 (c) 21/10 (d) 27/10

A. $\frac{31}{10}$

B. $\frac{29}{10}$

C. $\frac{21}{10}$

D. $\frac{27}{10}$

Answer:

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14. Number of integral points (integral points means both the co-ordinates should be integer) exactly in the interior of the triangle with vertices $(0, 0), (0, 15)$ and $Or(15, 0)$ is

A. 133

B. 190

C. 233

D. 105

Answer:

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15. The domain of the funciton $f(x)$ given by $3^x + 3^f = \min\left(2t^3 - 15t^2 + 36 + \ - 25, 2 + |\sin t|, 2 \leq t \leq 4\right)$ is

A. $(-\infty, 1)$

B. $(-\infty, \log_3 e)$

C. $(0, \log_3 2)$

D. $(-\infty, \log_3 2)$

Answer:

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16. The sum of the square of the length of the chord intercepted by the line n+y=n, $n \in N$ on the circle $x^2 + y^2 = 4$ is

A. 11

B. 22

C. 33

D. None of these

Answer:

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17. The value of $\int_0^1 \lim_{n \to \infty} \sum_{k=0}^{n} \frac{x^{k+2} 2^k}{k!} dx$ is:

A. $e^2 - 1$

B. 2

C. $\frac{e^2 - 1}{2}$

D. $\frac{e^2 - 1}{4}$

Answer:

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18. If $X = \{4^n - 3n - 1 : n \in N\} and Y = \{9(n-1) : n \in N\}$, where N is the set of natural numbers, then $X \cup Y$ is equal to

(1) N (2) Y - X (3) X (4) Y

A. X

B. Y

C. N

D. $Y - X$

Answer:

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19. The domain of $f(x) = \frac{\log_2(x+3)}{x^2 + 3x + 2}$ is

A. $R - \{-1, -2\}$

B. $(-2, \infty)$

C. $R - \{-1, -2-3\}$

D. $(-3, \infty) - \{-1, -2\}$

Answer:

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20. The least possible value of a for which $\frac{x^3 - 6x^2 + 11x - 6}{x^3 + x^2 - 10x + 8} + \frac{a}{30} = 0$does not have a real solution is

A. -10

B. 12

C. 5

D. -30

Answer: