MATHS

BOOKS - KVPY PREVIOUS YEAR

MOCK TEST 5

Exercise

1. If the complex numbers is $(1+ri)^3 = \lambda(1+i)$, when $i = \sqrt{-1}$, for some real λ, the value of r can be

A. $\cos \frac{\pi}{5}$

B. $\cos ec \frac{3\pi}{2}$

C. $\cos \frac{\pi}{12}$

D. $\cos ec \frac{\pi}{12}$

Answer:

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2. A quadrilateral is inscribed in a parabola, then which of the following is incorrect ?

A. quadrilateral may be cylic.

B. diagonals of the quadrilateral may be equal.

C. all possible pairs of adjacent sides may be perpendicular.

D. none of these.

Answer:

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3. Let $[a]$ denotes the larger integer not exceeding the real number a if x and y satisfy the equations $y = 2[x] + 3$ and $y = 3[x - 2[$ simultaneously determine $[x + y]$

A. 21

B. 9

C. 30

D. 12

Answer:

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4. The number of solution of the equation $\sin^3 x \cos x + \sin^2 x \cos^2 x + \cos^3 x \sin x + 1 = 0$ in the interval $[0, 2\pi]$ is equal to

A. 4

B. 2

C. 1

D. 0

Answer:

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5. The solution set of the inequality $\left|9^x - 3^{x+1} + 15\right| < 2.9^x - 3^x$ is

A. $(-\infty, 1)$

B. $(1, \infty)$

C. $(-\infty, 1]$

D. None of these

Answer:

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6. Let R be the relation in the set Z of all integers defined by R= {(x,y):x-y is an integer}. Then R is

A. reflexive

B. symmetric

C. transitive

D. an equivalence relation

Answer:

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7. If the integers m and n are chosen at random between 1 and 100, then the probability that a number of the form $7^m + 7^n$ is divisible by 5, equals (a) $\frac{1}{4}$ (b) $\frac{1}{7}$ (c) $\frac{1}{8}$ (d) $\frac{1}{49}$

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

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

C. $\frac{1}{8}$

D. $\frac{1}{49}$

Answer:

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8. If the circumcenter of an acute-angled triangle lies at the origin and the centroid is the middle point of the line joining the points (a^2+1, a^2+1) and $(2a, -2a)$, then find the orthocentre.

A. $y - 2ax = 0$

B. $y - (a^2+1)x = 0$

C. $y + x = 0$

D. $(a-1)^2 x - (a+1)^2 y = 0$

Answer:

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9. If $f(x) = \cos \pi(|x| + [x])$, then choose the incorrect option.

A. f is continuous at x = $\frac{1}{2}$

B. f is continuous at x = 0

C. f is differentiable in (-1,0)

D. f is differentiable in (0,1)

Answer:

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10. the set of equations $\lambda x - y + (\cos 0)z = 0, 3x + y + 2z = 0$ (cos 0) x+y+2z=0 ,$0 \leq 0 < 2\pi$ has non-trivial solution (s)

A. for no value of λ and θ

B. for all values of λ and θ

C. for all values of λ and only two values of θ

D. for only one value of λ and all values of θ

Answer:

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11. The probability that the graph of $y = 16x^2 + 8(a+5)x - 7a - 5 = 0,$ is strictly above the x-axis, If $a \in [-20, 0]$

A. $\frac{7}{20}$

B. $\frac{13}{20}$

C. $\frac{17}{20}$

D. $\frac{3}{20}$

Answer:

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12. Let $f: R \to R$ and $g: R \to R$ be two one-one and onto functions such that they are mirror images of each other about the line $y = a$. If $h(x) = f(x) + g(x)$, then $h(x)$ is (A) one-one onto (B) one-one into (D) many-one into (C) many-one onto

A. one-one onto

B. one-one into

C. many-one onto

D. many-one into

Answer:

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13. The value of a for which $ax^2 + \sin^{-1}(x^2 - 2x + 2) + \cos^{-1}(x^2 - 2x + 2) = 1$ has a real solution is $\frac{\pi}{2}$ (b) $-\frac{\pi}{2}$ (c) $\frac{2}{\pi}$ (d) $-\frac{2}{\pi}$

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

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

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

D. None of these

Answer:

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14. if the equation $x^4 - 4x^3 + ax^2 + bx + 1 = 0$ has four positive roots, then find a.

A. roots are necessarily integers

B. $a + b = 2$

C. ab=-24

D. None of these

Answer:

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15. If f(x)=$\begin{cases} \frac{[x]-1}{x-1} & x \neq 1 \\ 0 & x = 1 \end{cases}$ then f(x) is

A. continuous as well as differentiable at x=1

B. differentiable but not continuous at x= 1

C. continuous but not differentiableat x= 1

D. neither continuous nor differentiable at x=1

Answer:

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16. Calculate the area bounded by the curve $y = x(3-x)^2$ the x-axis and the ordinates of the maximum and minimum points of the curve.

A. 1 sq. unit

B. 2sq.unit

C. 4 sq. unit

D. None of these

Answer:

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17. If

$x, y, z \in R, x + y + z = 4$ and $x^2 + y^2 + z^2 = 6,$

then the maximum possible value of z is

A. $\sqrt{5} - 1$

B. $\sqrt{3}$

C. 2

D. None of these

Answer:

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18. the minimum value of $3\tan^2\theta + 12\cot^2\theta$ is (A) 6

(B) 15 (C) 24 (D) none of these

A. 6

B. 15

C. 24

D. None of these

Answer:

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19. If the range of the function $f(x) = \frac{x-1}{p-x^2+1}$ does not contain any values belonging to the inerval $\left[-1, \frac{-1}{3}\right]$ then the true set of values of p. is :

A. 2

B. 1

C. -1

D. 0

Answer:

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20. The $\int_{\tan^{-1}\alpha}^{\cot^{-1}\alpha} \frac{\tan x}{\tan x + \cot x} dx \alpha \in R$ cannot take the value (i) π (ii) $\frac{\pi}{2}$ (iii) $\frac{\pi}{4}$ (iv) $-\frac{\pi}{4}$

A. π

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

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

D. None of these

Answer:

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21. Let $f(x) = [x] + |1 - x|, \ -1 \leq x < 3$,(here [.] denotes greatest integer function). The number of points, where f(x) is non-differentiable is

A. 5

B. 0

C. 2

D. None of these

Answer:

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22. The greatest of the numbers $2^{\frac{1}{2}}, 3^{\frac{1}{3}}, 4^{\frac{1}{4}}, 5^{\frac{1}{5}}, 6^{\frac{1}{6}}$ and $7^{\frac{1}{7}}$ is

A. $2^{1/2}$

B. $3^{1/3}$

C. $7^{1/4}$

D. All but 1 are equal

Answer:

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

A. a rectangle

B. a square

C. a rhombus

D. None of these

Answer:

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24. ABCD is a convex quadrilateral and 3, 4, 5, and 6 points are marked on the sides AB, BC, CD, and DA, respectively. The number of triangles with vertices on different sides is a. 270 b. 220 c. 282 d. 342

A. 215

B. 342

C. 225

D. 424

Answer:

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