MATHS

BOOKS - KVPY PREVIOUS YEAR

MOCK TEST 2

Exercise

1. The minimum area of triangle formed by the tangent to the $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ & coordinates axes is

A. ab sq.units

B. $\frac{a^2+b^2}{2}$ sq.units

C. $\frac{(a+b)^2}{2}$ sq.units

D. $\frac{a^2+ab+b^2}{3}$ sq.units

Answer:

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2. The equation $(\cos p-1)^x$ ^ $2+(\cos p)x+s\in p=0$ in the variable x has real roots. The p can take any value in the interval $(0,2\pi)$ (b) $(-\pi)$ (c) $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$ (d) $(,\pi)$

A. $(0,2\pi)$

B. $(-\pi,0)$

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

D. $(0,\pi)$

Answer:

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3. Let $f(x) = \sin^3 x + \lambda \sin^2 x$ where $-\pi/2 < x < \pi/2$. Find the intervals in which λ should lie in order that f(x) has exactly one minimum.

A. (-1,1)

B. $\left(-\frac{3}{2}, 0\right) \cup \left(0, \frac{3}{2}\right)$

C. $(0, \infty)$

D. $\left(-\frac{3}{2}, -\frac{1}{2}\right) \cup \left(\frac{1}{2}, \frac{3}{2}\right)$

Answer:

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4. The set of all points, where the function $f(x) = \frac{x}{1+|x|}$ is differentiable, is

A. $(-\infty, \infty)$

B. $(0, \infty)$

C. $(-\infty, 0) \cup (0, \infty)$

D. None of these

Answer:

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5. Let $f: [-2, 3] \to [0, \infty)$ be a continuous function such that $f(1-x) = f(x)$ for all $x \in [-2, 3]$.If R_1 is the numerical value of the area of the region bounded by $y = f(x), x - 2, x = 3$ and the axis of x and $R_2 = \int_{-2}^{3} x f(x) dx$, then

A. $3R_1 = 2R_2$

B. $2R_1 = 3R_2$

C. $R_1 = R_2$

D. $R_1 = 2R_2$

Answer:

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6. Let f be a real valued function such that for any real x, $f(\lambda + x) = f(\lambda - x)$ and $f(2\lambda + x) = f(2\lambda - x)$ for some $\lambda > 0$. Then

A. f is even and non-periodic

B. f is odd and periodic

C. f is odd and non-periodic

D. f is even and periodic

Answer:

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7. Let f(x) = [n + p sin x], $x \in (0, \pi), n \in Z$, p a prime number and [x] = the greatest integer less than or equal to x. The number of points at which f(x) is not not differentiable is :

A. p

B. 1

C. 2p+1

D. 2p-1

Answer:

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8. Let f be a differentiable function satisfying

$[f(x)]^n = f(nx) \quad \text{for all} \quad x \in R.$

Then, $f'(x)f(nx)$

A. f(x)

B. 0

C. $f(x)f'(nx)$

D. None of these

Answer:

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9. The number of all triplets (a_1, a_2, a_3) such that $a_1 + a_2 \cos 2x + a_3 \sin^2 x = 0$ for all x is : (A) 0 (B) 1 (C) 3 (D) Infinite

A. zero

B. one

C. three

D. infinite

Answer:

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10. Find the value of $\int_{-1}^{\frac{3}{2}} |x \sin \pi x| dx$

A. $\frac{3}{\pi} + \frac{2}{\pi^2}$

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

C. $\frac{3}{\pi} + \frac{1}{\pi^2}$

D. $\frac{3}{\pi} - \frac{1}{\pi^2}$

Answer:

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11. Three points P, Q and R are selected at random from the cirumference of a circle. Find the probability p that the point lie on a semi-circle

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

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

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

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

Answer:

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12. A quadratic polynomial maps from $[-2, 3]$ onto [0, 3] and touches x-axis at x = 3, then the polynomial is

A. $\frac{3}{16}(x^2 - 6x + 16)$

B. $\frac{3}{25}(x^2 - 6x + 9)$

C. $\frac{3}{25}(x^2 - 6x + 16)$

D. $\frac{3}{16}(x^2 - 6x + 9)$

Answer:

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13. if the product of n matrices $\begin{bmatrix}1 & 1\\0 & 1\end{bmatrix}\begin{bmatrix}1 & 2\\0 & 1\end{bmatrix}\begin{bmatrix}1 & 3\\0 & 1\end{bmatrix}\ldots\begin{bmatrix}1 & n\\0 & 1\end{bmatrix} isequal \to thematrix \begin{bmatrix}1 & 378\\0 & 1\end{bmatrix}$ the value of n is equal to

A. 26

B. 27

C. 337

D. 378

Answer:

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14. Universal set,

$U = \{x \mid x^5 - 6x^4 + 11x^3 - 6x^2 = 0\}$

$A = \{x \mid x^2 - 5x + 6 = 0\}$

$B = \{x \mid x^2 - 3x + 2 = 0\}$

What is $(A \cap B)'$ equal to ?

A. 2

B. 3

C. 4

D. 5

Answer:

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15. If $P(3\sec\theta, 2\tan\theta)$ and $Q(3\sec\phi, 2\tan\phi)$ where $\theta + \pi = \frac{\phi}{2}$ be two distainct points on the hyperbola then the ordinate of the point of intersection of the normals at p and Q is

A. $\frac{11}{3}$

B. $-\frac{11}{3}$

C. $\frac{13}{2}$

D. $-\frac{13}{2}$

Answer:

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16. Let f(x) be defined by $f(x) = x - [x], 0 \neq x \in R$, where [x] is the greatest integer less than or equal to x then the number of solutions of $f(x) + f\left(\frac{1}{x}\right) = 1$

A. 0

B. infinite

C. 1

D. 2

Answer:

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17. Let A (-2,2)and B (2,-2) be two points AB subtends an angle of 45° at any points P in the plane in such a way that area of ΔPAB is 8 square unit, then number of possibe position(s) of P is

A. 1

B. 2

C. 4

D. infinity

Answer:

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18. 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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19. 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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20. Find the number of point (x, y) having integral coordinates satisfying the condition $x^2 + y^2 < 25$

A. 69

B. 80

C. 81

D. 77

Answer:

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21. The least value of the expression $x^2 + 4y^2 + 3z^2 - 2x - 12y - 6z + 14$ is 3 b. no least value c. 0 d. none of these

A. 0

B. 1

C. no least value

D. None of these

Answer:

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22. Let $f(\theta) = \sin\theta(\sin\theta + \sin 3\theta)$. $Then$, $f(\theta)$

A. ≥ 0 only when $\theta \geq 0$

B. ≤ 0 for all θ

C. ≥ 0 for all real θ

D. $\leq 0 only when$thetale0`

Answer:

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23. In what ratio does the x-axis divide the area of the region bounded by the parabolas $y = 4x - x^2 and y = x^2 - x$?

A. $\frac{115}{4}$

B. $\frac{125}{2}$

C. $\frac{121}{2}$

D. $\frac{121}{4}$

Answer:

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24. For all complex numbers z_1, z_2 satisfying $|z_1| = 12$ and $|z_2 - 3 - 4i| = 5$ the minimum value of $|z_1 - z|2|$ is (A) 0 (B) 2 (C) 7 (D) 17

A. 0

B. 2

C. 7

D. 17

Answer:

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25. If $f(x+y)=f(x)-f(y)+2xy-1\forall x, y\in R$. Also if f(x) is differentiable and f'(0)=b also $f(x)>0\forall x$, then the set of values of b

A. $f(x)>0\forall x\in R$

B. $f(x)<0\forall x\in R$

C. $f(x)=\sin\phi\forall x\in R$

D. None of these

Answer:

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