MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 72

Mathematics

1. The line x = c cuts the triangle with corners (0,0) , (1,1) and (9,1) into two regions .For the area of the two regions to the same , then c must be equal to

A. 30

B. 6

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

D. 15

Answer: B

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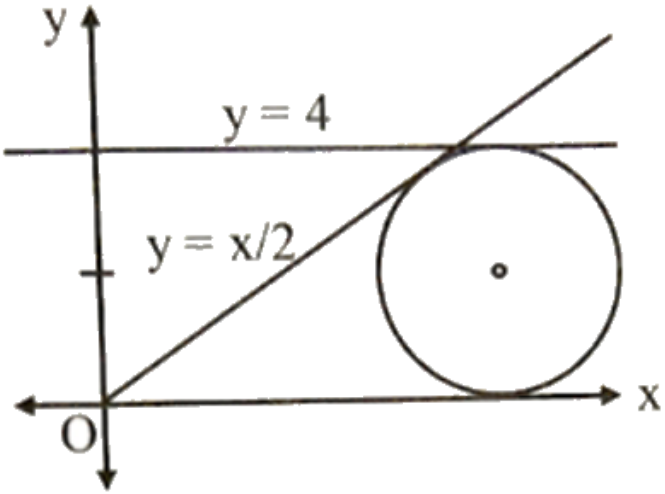
2. The distance of the y - axis from from the center of the circle which lies in the first quadrant (see figure) and tangent to the lines $y = \frac{1}{2}x, y = 4$ and the x-axis is



A. $4 + 2\sqrt{5}$ units

B. $4 - \frac{8\sqrt{5}}{5}$ units

C. $2 + \frac{6\sqrt{5}}{5}$ units

D. $4 - 2\sqrt{5}$ units

Answer: A

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3. A tangent is drawn to the parabola $y^2 = 8x$ at P(2, 4) to intersect the x-axis at Q, from which another tangent is drawn to the parabola to touch it at R. If the normal at R intersects the parabola again at S, then the coordinates of S are

A. (6, 4)

B. (18, 12)

C. (8, 8)

D. (8, 6)

Answer: B

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4. The tangents at the extremities of the latus rectum of the ellipse $3x^2 + 4y^2 = 12$ form a rhombus PQRS. Area (in sq. units) of the rhombus PQRS outside and ellipse is equal to

A. $8 - 2\sqrt{3}\pi$

B. $12 - 2\sqrt{3}\pi$

C. $14 - \pi$

D. $16 - 2\sqrt{3}\pi$

Answer: D

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5. Consider the function $f(x) = \min\left\{\left|x^2 - 4\right|, \left|x^2 - 1\right|\right\}$, then the number of points where f(x) is non - differentiable is/are

A. 0

B. 7

C. 6

D. 4

Answer: C

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6. If $f: A \to B$ defined as $f(x) = 2\sin x - 2\cos x + 3\sqrt{2}$ is an invertible function, then the correct statement can be

A. $A = \left[\frac{\pi}{4}, \frac{5\pi}{4}\right], B = \left[2\sqrt{2}, 5\sqrt{5}\right]$

B. $A = \left[\frac{-\pi}{4}, \frac{5\pi}{4}\right], B = \left[\sqrt{2}, 5\sqrt{2}\right]$

C. $A = \left[\frac{-\pi}{4}, \frac{3\pi}{4}\right], B = \left[\sqrt{2}, 4, \sqrt{2}\right]$

D. $A = \left[\frac{-\pi}{4}, \frac{3\pi}{4}\right], B = \left[\sqrt{2}, 5\sqrt{2}\right]$

Answer: D

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7. The average weight of students in a class of 32 students is 40 kg. If the weight of the teacher be included, the average rises by $\frac{1}{3}kg$, then the weight of the teacher is

A. $40.5kg$

B. $50kg$

C. $41kg$

D. $51kg$

Answer: D

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8. An observer finds that the angular elevation of a tower is θ. On advancing 3m towards the tower, the elevation is 45° and on advancing 2m further more towards the tower, the elevation is

$90^\circ - \theta$. The height of the tower is (assume the height of observer is negligible and observer lies on the same level as the foot of the tower)

A. 2m

B. 4m

C. 6m

D. 8m

Answer: C

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9. Let $\vec{a} = 2\hat{i} - \hat{j} + 3\hat{k}$, $\vec{b} = \hat{i} + \hat{j} - 4\hat{k}$ and non - zero vector $\vec{c}$ are such that $\left(\vec{a} \times \vec{b}\right) \times \vec{c} = \vec{a} \times \left(\vec{b} \times \vec{c}\right)$, then vector $\vec{c}$ may be

A. $4\hat{i} - 2\hat{j} + 6\hat{k}$

B. $4\hat{i} + 2\hat{j} + 6\hat{k}$

C. $\hat{i}+\hat{j}-\hat{k}$

D. $\hat{i}-4\hat{j}+\hat{k}$

Answer: A

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10. Let a, b and c are the roots of the equation $x^3-7x^2+9x-13=0$ and A and B are two matrices given by $A=\begin{bmatrix} a & b & c \\ b & c & a \\ c & a & b \end{bmatrix}$ and $B=\begin{bmatrix} bc-a^2 & ca-b^2 & ab-c^2 \\ ca-b^2 & ab-c^2 & bc-a^2 \\ ab-c^2 & bc-a^2 & ca-b^2 \end{bmatrix}$, then the value $|A||B|$ is equal to

A. -154

B. $-(154)^3$

C. -22

D. $-(22)^3$

Answer: B

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11. A plane P_1 has the equation $4x - 2y + 2z = 3$ and P_2 has the equation $-x + ky - 2z = 7$. If the angle between P_1 and P_2 is $\frac{2\pi}{3}$, then the value of k can be

A. 1

B. 2

C. -17

D. 17

Answer: D

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12. Let $A = \begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix}$, where $i^2 = -1$. Let I denotes the identity matrix of order 2, then $I + A + A^2 + A^3 + \ldots\ldots\ldots A^{110}$ is equal to

A. $\begin{bmatrix} 0 & i \\ i & 0 \end{bmatrix}$

B. $\begin{bmatrix} 0 & 0 \\ 0 & \end{bmatrix}$

C. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

D. $\begin{bmatrix} -1 & 0 \\ 0 & 0 \end{bmatrix}$

Answer: A

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13. The inequality $.^{n+1}C_6 - .^nC_4 > .^nC_5$ holds true for all n greater than _____.

A. 8

B. 9

C. 7

D. 10

Answer: D

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14. Find the values of m for which roots of equation $x^2 - mx + 1 = 0$ are less than unity.

A. $m \leq -2$

B. $m > 2$

C. $1 \leq m, \leq 3$

D. $0 \leq m \leq \frac{5}{2}$

Answer: A

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15. 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. 0

B. 2

C. 4

D. 8

Answer: A

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16. The solution of the differential equation $\frac{dy}{dx} + \frac{xy}{1-x^2} = x\sqrt{y}, (|x| < 1)$ is $\sqrt{y} = -\frac{f(x)}{3} + C(1-x^2)^{\frac{1}{4}}$, where $f\left(\frac{1}{2}\right) = \frac{3}{4}$ and C is an arbitrary constant. Then, the value of $f\left(-\frac{1}{2}\right)$ is

A. $-\frac{3}{4}$

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

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

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

Answer: B

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17. The limit $L = \lim_{n \to \infty} \Sigma_{r=1}^{n} \frac{n}{n^2 + r^2}$ satisfies

A. $\frac{\pi}{L} < 6$

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

C. $\frac{\pi}{L} > 3$

D. $\frac{\pi}{L} < 1$

Answer: C

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18. If the integral $I = \int \frac{x^5}{\sqrt{1+x^3}} dx = K\sqrt{x^3+1}(x^3-2) + C$, (where, C is the constant of integration), then the value of 9K is equal to

A. 4

B. 2

C. 6

D. 10

Answer: B

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19. The function $f(x) = 2x^3 - 3(a+b)x^2 + 6abx$ has a local maximum at $x = a$, if

A. $a > b$

B. $a < b$

C. $a > 0$

D. $a < 0$

Answer: B

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20. If $A = \{x : x = 3^n - 2n - 1, n \in N\}$ and $B = \{x : x = 4(n-1), n \in N\}$. Then

A. $A \subset B$

B. $B \subset A$

C. $A \cup B = A$

D. $A \cap B = B$

Answer: A

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21. If the area bounded by the curves $x^2 + y^2 \leq 4, x + y \leq 2,$ and $y \geq 1$ is $\frac{2\pi}{K} - \frac{\sqrt{K}}{2} - \frac{1}{2} sq.$ units, then the value of K is equal to

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22. The second term of an infinte geometric progression is 2 and its sum to infinity is 8. The first term is

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23. The probability of a bomb hitting a bridge is $\frac{2}{3}$. Two direct hits are needed to destroy the bridge. The minimum number of bombs

required such that the probability of bridge being destroyed is greater than $\frac{3}{4}$, is

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24. The value of $\lim_{x \to 0} \frac{9\ln(2 - \cos 25x)}{5\ln^2(\sin 3x + 1)}$ is equal to

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25. The number of distinct complex number(s) z, such that $|z| = 1$ and z^3 is purely imagninary, is/are equal to

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