MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 37

Mathematics

1. If the garph of the function $f(x) = ax^3 + x^2 + bx + c$ is symmetric about the line x = 2, then the value of $a + b$ is equal to

A. 10

B. -4

C. 16

D. -10

Answer: B

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2. If $y = 2 + \sqrt{\sin x + 2 + \sqrt{\sin x + 2 + \sqrt{\sin x + \ldots \infty}}}$ then the value of $\frac{dy}{dx}$ at x = 0 is

A. 0

B. 2

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

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

Answer: D

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3. From a point P, two tangents PA and PB are drawn to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. If these tangents cut the coordinates axes at 4 concyclic points, then the locus of P is

A. $x^2 - y^2 = |a^{2-b^2}|$

B. $x^2 - y^2 = a^2 + b^2$

C. $x^2 + y^2 = |a^2 - b^2|$

D. $x^2 + y^2 = a^2 + b^2$

Answer: B

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4. Let $f(x) = x^3 + x^2 + x + 1$, then the area (in sq. units) bounded by $y = f(x), x = 0, y = 0$ and $x = 1$ is equal to

A. $\frac{25}{3}$

B. $\frac{25}{12}$

C. $\frac{12}{5}$

D. $\frac{5}{3}$

Answer: B

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5. The variance of the first 20 positive integral multiples of 4 is equal to

A. 532

B. 133

C. 266

D. 600

Answer: A

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6. Eleven objects $A, B, C, D, E, F, \alpha, \alpha, \alpha, \beta$ and β are arranged in a row, then the probability that every β has two α as neighbors is

A. $\frac{1}{1320}$

B. $\frac{1}{7920}$

C. $\frac{1}{110}$

D. $\frac{1}{660}$

Answer: D

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7. If $\vec{a} = \hat{i} + \hat{j} + 2htk, bec = \hat{i} + 2\hat{j} + 2\hat{k}$ and $\left|\vec{c}\right| = 1$, then the maximum value of $\left[\vec{a} \times \vec{b}\,\vec{b} \times \vec{c}\,\vec{c} \times \vec{a}\right]$ is equal to

A. 2

B. 3

C. 4

D. 5

Answer: D

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8. If the differential equation $3x^{\frac{1}{3}}dy + x^{\frac{-2}{3}}ydx = 3xdx$ is satisfied by $kx^{\frac{1}{3}}y = x^2 + c$ (where c is an arbitrary constant), then the value of k is

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

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

C. 2

D. 1

Answer: C

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9. Let z and w be non - zero complex numbers such that $zw = |z^2|$ and $|z - \bar{z}| + |w + \overline{w}| = 4$. If w varies, then the perimeter of the locus of z is

A. $8\sqrt{2}$ units

B. $4\sqrt{2}$ units

C. 8 units

D. 4 units

Answer: A

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10. The sum of the roots of the equation $2^{(33x-2)} + 2^{(11x+2)} = 2^{(22x+1)} + 1$ is

A. $\frac{1}{11}$

B. $\frac{2}{11}$

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

D. $\frac{4}{11}$

Answer: B

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11. For $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$, the number of point of intersection of curves $y = \cos x$ and $y = \sin 3x$ is

A. 0

B. 1

C. 2

D. 3

Answer: D

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12. A balloon moving in a straight line passes vertically above two points A and B on a horizontal plane 300 ft apart. When above A it has an altitude of 30° as seen from A. The distance of B it has an altitude of 30° as seen from A. The distance of B from the point C where it will touch the plane is

A. $150\left(\sqrt{3}+1\right)ft$

B. $150ft$

C. $150\left(3+\sqrt{3}\right)ft$

D. $300\left(\sqrt{3}+1\right)ft$

Answer: A

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13. The value of $\lim_{x \to 0^-} \frac{4^{2+\frac{3}{x}} + 5\left(2^{\frac{1}{x}}\right)}{2^{\left(1+\frac{6}{x}\right)} + 6\left(2^{\frac{1}{x}}\right)}$ is equal to

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

B. 8

C. 16

D. $\frac{5}{2}$

Answer: A

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14. If $2^{2020} + 2021$ is divided by 9, then the remainder obtained is

A. 0

B. 1

C. 3

D. 7

Answer: C

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15. The value of the integral $\int x^{\frac{1}{3}}\left(1-\sqrt{x}\right)^3 dx$ is equal to (where c is the constant of integration)

A. $6\left(\frac{x^{\frac{4}{3}}}{8}+\frac{3}{11}x^{\frac{11}{6}}+\frac{3}{14}x^{\frac{7}{3}}+\frac{1}{17}x^{\frac{17}{6}}\right)+c$

B. $6\left(\frac{x^{\frac{4}{3}}}{8}-\frac{3}{11}x^{\frac{11}{6}}+\frac{3}{14}x^{\frac{7}{3}}-\frac{1}{17}x^{\frac{17}{6}}\right)+c$

C. $2\left(\frac{x^{\frac{4}{3}}}{8}-\frac{3}{11}x^{\frac{11}{6}}-\frac{3}{14}x^{\frac{7}{3}}-\frac{1}{17}x^{\frac{17}{6}}\right)+c$

D. $2\left(\frac{x^4}{8}-\frac{3}{11}x^{11}-\frac{3}{11}x^7-\frac{1}{17}x^{17}\right)+c$

Answer: B

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16. If $y = f(x)$ satisfies has conditions of Rolle's theorem in $[2, 6]$, then $\int_2^6 f'(x)dx$ is equal to

A. 2

B. 0

C. 4

D. 6

Answer: B

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17. Let D is a point on the line $l_1 : x + y = 2 = 0$ and $S(3, 3)$ is a fixed point. The line l_2 is perpendicular to DS and passes through S. If M is another point on the line l_1 (other than D), then the locus of the point of intersection of l_2 and the angle bisector of the angle MDS is

A. $(x + y - 2)^2 = 2(x - 3)^2 + 2(y - 3)^2$

B. $(x + y - 2)^2 = (x - 2)^2 + (y - 3)^2$

C. $(x + y - 2)^2 = \dfrac{(x - 3)^2 + (y - 3)^2}{2}$

D. None of these

Answer: A

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18. If

$a+b+c=0$ and $a^2+b^2+c^2-ab-bc-ca\neq 0,\ \forall a,b,c\in R$

then the system of equations

$ax+by+cz=0, bx+cy+az=0$ and $cx+ay+bz=0$

has

A. A unique solution

B. Infinte solutions

C. No solution

D. Exactly two solutions

Answer: B

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19. If $ax + 13y + bz + c = 0$ is a plane through the line intersection of $2x + 3y - z + 1 = 0, x + y - 2z + 3 = 0$ and is perpendicular to the plane $3x - y - 2z = 4$, then the value of $2a + 3b + 4c$ is equal to

A. -12

B. 12

C. 10

D. -10

Answer: D

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20. Let the points $A: (0, a), B: (-2, 0)$ and $C: (1, 1)$ form an obtuse angled triangle (obtuse angled at angle A), then the

complete set of values of a is

A. $(-2, 1)$

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

C. $(-1, 2)$

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

Answer: D

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21. Let normals to the parabola $y^2 = 4x$ at variable points $P(t_1^2, 2t_1)$ and $Q(t_2^2, 2t_2)$ meet at the point $R(t^2 2t)$, then the line joining P and Q always passes through a fixed point (α, β), then the value of $|\alpha + \beta|$ is equal to

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22. Let A be a square matrix of order 3 such that $A = A^T = \begin{bmatrix} 10 & 4 & 6 \\ a_{21} + a_{12} & 6 & a_{23} + a_{32} \\ a_{31} + a_{13} & 8 & 4 \end{bmatrix}$,where a_{12}, a_{23}, a_{31} are positive roots of the equation $x^3 - 6x^2 + px - 8 = 0, \forall p \in R$, then the absolute vlaue of $|A|$ is equal to

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23. If 4 dice ae rolled once, the numberof ways of getting the sum as 10 is K, then the value of $\frac{K}{10}$ is equal to

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24. Let $X_1, X_2, X_3 \ldots\ldots$ are in arithmetic progression with a common difference equal to d which is a two digit natural

number. $y_1, y_2, y_3 \ldots\ldots\ldots$ are in geometric progression with common ratio equal to 16. Arithmetic mean of $X_1, X_2 \ldots\ldots\ldots X_n$ is equal to the arithmetic mean of $y_1, y_2 \ldots\ldots y_n$ which is equal to 5. If the arithmetic mean of $X_6, X_7 \ldots\ldots X_{n+5}$ is equal to the arithmetic mean of $y_{P+1}, y_{P+2} \ldots\ldots y_{P+n}$ then d is equal to

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25. The equation $x^3 + 3x^2 + 6x + 3 - 2\cos x = 0$ has n solution(s) in (0, 1), then the value of $(n + 2)$ is equal to

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