MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 97

Mathematics

1. If $e^x + e^{f(x)} = e$, then the domain of the function f is

A. $(-\infty, 1]$

B. $(-\infty, 1)$

C. $(-1, \infty)$

D. $[1, \infty)$

Answer: B

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2. The value of $\lim_{n \to \infty} \left(\cos. \frac{x}{2} \cos. \frac{x}{4} \cos. \frac{x}{8} \ldots\ldots\ldots \cos. \frac{x}{2^{n+1}} \right)$ is equal to

A. $\frac{x}{\sin x}$

B. $\frac{\sin x}{x}$

C. 0

D. None of these

Answer: B

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3. Let

$$f(x) = \begin{cases} (1+|\sin x|)^{\frac{1}{|\sin x|}}, & -\frac{\pi}{6} < x < 0 \\ e^{\frac{\tan 2x}{\tan 3x}}, & 0 < x < \frac{\pi}{6} \\ m, & x = 0 \end{cases}$$

at

$x = 0$. Then, the value of l and m are

A. $l = -\frac{2}{3}, m = e^{\frac{2}{3}}$

B. $l = \frac{2}{3}, m = e^{-\frac{2}{3}}$

C. $l = \frac{2}{3}, m = e^{\frac{2}{3}}$

D. None of these

Answer: C

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4. In a series of 2n observations, half of them are equal to a^2 and the remaining half are equal to $-a^2$. If the standard deviation of the observation is 2, then $|a|$ is equal to

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

B. $\sqrt{2}$

C. 2

D. $\frac{\sqrt{2}}{n}$

Answer: B

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5. The number of non negative integral solution of the equation, $x + y + 3z = 33$ is

A. 120

B. 135

C. 210

D. 520

Answer: C

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6. The least integral value of $'a'$ for which the graphs $y = 2ax + 1$ and $y = (a - 6)x^2 - 2$ do not intersect:

A. -6

B. -5

C. 3

D. 2

Answer: B

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7. If the sum of the first 2n terms of the $A.P. 2, 5, 8, \ldots,$ is equal to the sum of the first n terms of the $A.P. 57, 59, 61, \ldots,$ then n equals

A. 10

B. 12

C. 11

D. 13

Answer: C

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8. The solution set of $x \in (-\pi, \pi)$ for the inequality $\sin 2x + 1 \leq \cos x + 2\sin x$ is

A. $x \in \left[0, \frac{\pi}{6}\right]$

B. $x \in \left[\frac{\pi}{6}, \frac{5\pi}{6}\right] \cup \{0\}$

C. $x \in \left[-\frac{\pi}{6}, \frac{5\pi}{6}\right]$

D. $x \in \left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

Answer: B

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9. The integral $I = \int \sin(2\theta)\left[\frac{1+\cos^2\theta}{2\sin^2\theta}\right]d\theta$ simplifies to (where, c is the integration constant)

A. $\ln|\sin\theta| + \cos\theta + c$

B. $2\ln|\sin\theta| - \frac{\sin^2\theta}{2} + c$

C. $\ln|\sin\theta| - \sin^2\theta + c$

D. $\ln|\cos\theta| + \cos^2\theta + c$

Answer: B

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10. If $f(x)$ satisfies $f(x)+f(3-x)=3 \forall x \in R$, then the value of integral $I=\int_{\frac{3}{4}}^{\frac{9}{4}} f(x)dx$ is equal to

A. 3

B. 6

C. $\frac{9}{4}$

D. $\frac{9}{2}$

Answer: C

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11. The area (in sq. units) bounded by $y = x|x|$ and the line $y = x$ is equal to

A. 1

B. 2

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

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

Answer: D

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12. The equation of the curve for which the slope of the tangent at any point is given by $(x+y+1)\left(\frac{dy}{dx}\right)=1$ is (where, c is an arbitrary constant)

A. $xy = e^x - c$

B. $xy = ce^y + 2$

C. $x = ce^y - y - 2$

D. $x = e^y + y - c$

Answer: C

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13. Three boxes are labeled as A, B and C and each box contains 5 balls numbered 1, 2, 3, 4 and 5. The balls in each box are well mixed and one ball is chosen at random from each of the 3 boxes. If α, β and γ are the number on the ball from the boxes A, B and C respectively, then the probability that $\alpha = \beta + \gamma$ is equal to

A. $\frac{1}{25}$

B. $\frac{2}{25}$

C. $\frac{4}{25}$

D. $\frac{1}{5}$

Answer: B

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14. An line parallel to $6\hat{i} - 3\hat{j} + 2\hat{k}$ intersects the line $\frac{x}{1} = \frac{y}{2} = \frac{z}{2}$ at A and the line $\frac{x+1}{1} = \frac{y+2}{2} = \frac{z+3}{2}$ at B, then the length of AB is equal to

A. $\frac{3}{\sqrt{7}}$ units

B. $\frac{5}{\sqrt{439}}$ units

C. $\frac{7}{\sqrt{85}}$ units

D. $\frac{9}{\sqrt{425}}$ units

Answer: C

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15. The value of $\begin{vmatrix} \cos.\frac{2\pi}{63} & \cos.\frac{3\pi}{70} & \cos.\frac{4\pi}{77} \\ \cos.\frac{\pi}{72} & \cos.\frac{\pi}{40} & \cos.\frac{3\pi}{88} \\ 1 & \cos.\frac{\pi}{90} & \cos.\frac{2\pi}{99} \end{vmatrix}$ is equal to

A. 0

B. 1

C. $2\cos.\frac{\pi}{9}$

D. $\cos.\frac{\pi}{11}$

Answer: A

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16. If the system of equation $14x - 3y + z = 12, x - 2y = 0$ and $x + 2z = 0$ has a solution (x_0, y_0, z_0), then the value of $x_0^2 + y_2^2 + z_2^2$ is equal to

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

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

C. $\frac{9}{2}$

D. $\frac{9}{4}$

Answer: A

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17. A triangle has two of its vertices at $(0, 1)$ and $(2, 2)$ in the cartesian plane. Its third vertex lies on the x-axis. If the area of the triangle is 2

square units then the sum of the possible abscissae of the third vertex, is-

A. 40

B. 10

C. 52

D. 61

Answer: A

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18. If a circle passes through the point (1, 1) and cuts the circle $x^2 + y^2 = 1$ orthogonally, then the locus of its centre is

A. $x^2 + y^2 - 3x - 3y + 1 = 0$

B. $2x + 2y - 1 = 0$

C. $x^2 + y^2 - 2x - 2y + 1 = 0$

D. $2x + 2y - 3 = 0$

Answer: D

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19. The length of intercept cut but the line $4x + 4\sqrt{3}y - 1 = 0$ on the curve $y^2 = 4\left(x + \frac{3}{4}\right)$ is equal to

A. 4 units

B. 9 units

C. 12 units

D. 16 units

Answer: D

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20. If the eccentricity of the hyperbola $\frac{x^2}{(1+\sin\theta)^2} - \frac{y^2}{\cos^2\theta} = 1$ is $\frac{2}{\sqrt{3}}$, then the sum of all the possible values of θ is (where, $\theta \in (0, \pi)$)

A. $\frac{5\pi}{4}$

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

C. $\frac{7\pi}{4}$

D. π

Answer: D

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21. At the foot of a mountain the elevation of its summit is 45°, after ascending 1000m towards the mountain up a slope of 30° inclination, the elevation is found to be 60° Find the height of the mountain.

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22. If the coefficient of x^7 in $\left(ax^2 + \frac{1}{bx}\right)^{11}$ is equal to the coefficient of x^7 in $\left(ax - \frac{1}{bx^2}\right)^{11}$

then

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23. The smallest natural value of a for which the function

$f(x) = 2(x+1) - a\left(2^{-x}\right) + (2a+1)(\ln 2)x - 6$

is increasing $\forall x \in R$, is

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24. Let $\vec{r} \times \vec{a} = \vec{b} \times \vec{a}$ and $\vec{c}\vec{r} = 0$, where $\vec{a} . \vec{c} \neq 0$, then $\vec{a} . \vec{c}\left(\vec{r} \times \vec{b}\right) + \left(\vec{b} . \vec{c}\right)\left(\vec{a} \times \vec{r}\right)$ is equal to _____.

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25. If z is a complex number such that $|z| = 2$, then the area (in sq. units) of the triangle whose vertices are given by $z, -iz$ and $iz - z$ is equal to

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