MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 67

Mathematics

1. The value of $\sin\left\{\cot^{-1}\left[\cos\left(\cot^{-1}\left(\frac{1}{x}\right)\right)\right]\right\}$ is equal to $(x > 0)$

A. $\sqrt{\frac{1+x^2}{2+x^2}}$

B. $\sqrt{\frac{1-x^2}{2+x^2}}$

C. $\sqrt{\frac{1+x^2}{2-x^2}}$

D. $\sqrt{\frac{2+x^2}{1+x^2}}$

Answer: A

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2. The integral $I = \int_0^{100\pi} \left[\tan^{-1} x\right] dx$ (where, $[.]$ represents the greatest integer function)

has the vlaue $K(\pi) + \tan(p)$ then value of $K + p$ is equal to

A. 101

B. 99

C. 100π

D. 99π

Answer: B

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3. Which of the following functions is injective ?

A. $f(x) = x^2 + 3, x \in (-\infty, \infty)$

B. $f(x) = |x + 1|, x \in [2, \infty)$

C. $f(x) = (x - 4)(x - 5), x \in (\infty, 5]$

D. $f(x) = \dfrac{4x^2 + 3x - 5}{4 + 3x + 5x^2}, x \in (-\infty, \infty)$

Answer: B

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4. Let $A = \begin{bmatrix} 2 & 0 & 7 \\ 0 & 1 & 0 \\ 1 & -2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -k & 14k & 7k \\ 0 & 1 & 0 \\ k & -4k & -2k \end{bmatrix}$. If $AB = I$, where I is an identity matrix of order 3, then the sum of all elements of matrix B is equal to

A. 2

B. $\frac{3}{7}$

C. $\frac{10}{3}$

D. 4

Answer: D

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5. The length of the major axis of the ellipse $(5x-10)^2+(5y+13)^2=\frac{(3x-4y+7)^2}{4}$ is

A. $\frac{10}{3}$ units

B. $\frac{10}{\sqrt{3}}$ units

C. $\frac{20}{3}$ units

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

Answer: D

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6. The quadratic equations $x^2 - 6x + a = 0 and x^2 cx + 6 = 0$ have one root in common. The other roots of the first and second equations are integers in the ratio 4 : 3. Then the common root is

A. 4

B. 3

C. 2

D. 1

Answer: C

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7. The 5^{th} and the 31^{th} terms of an arithmetic progression are, respectively 1 and -77. If the K^{th} term of the given arithmetic progression is -17, then the value of K is

A. 12

B. 10

C. 11

D. 13

Answer: C

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8. General solution of the equation

$4\cot 2\theta = \cot^2\theta - \tan^2\theta$ is θ =

A. $n\pi \pm \frac{\pi}{4}$

B. $n\pi \pm \frac{\pi}{3}$

C. $2n\pi \pm \frac{\pi}{3}$

D. $2n\pi \pm \frac{\pi}{6}$

Answer: A

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9. Let $f(x) = \begin{cases} 1 + \sin x & x < 0 \\ x^2 - x + 1 & x \geq 0 \end{cases}$

A. $x = 0$ is a point of local maxima

B. $2f(0) = 1$ has no real solution in $x \in (0, \infty)$

C. $f(x)$ is increasing in $x \in (2, \pi)$

D. $f(x)$ is increasing in $x \in \left(0, \frac{1}{2}\right)$

Answer: D

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10. The arithmetic mean of a set of 50 numbers is 38. If two numbers of the set, namely 60 and

40 discarded, the arithmetic mean of the remaining set of numbers is

A. 38.5

B. 37.5

C. 36.5

D. 36

Answer: B

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11. The area bounded by $y = \max\left(x^2, x^4\right), y = 1$ and the y - axis from $x = 0$ to $x = 1$ is

A. 3 sq. units

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

C. $\frac{2}{3}$ sq. units

D. $\frac{1}{2}$ sq. units

Answer: C

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12. the solution of the differential equation $\frac{dy}{dx} = ax + b, a \neq 0$ represents

A. a parabola

B. an ellipse

C. a circle

D. a hyperbola

Answer: A

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13. If $\vec{m}, \vec{n}$ are non - parallel unit vectors and $\vec{r}$ is a vector which is perpendicular to $\vec{m}$ and $\vec{n}$ such that $\left|\vec{r}\right| = 5$ and $\left|\vec{m} + \vec{n}\right|^2 = 2 + 4\left|\vec{m} \times \vec{n}\right|$, then the value of $\left|\left[\vec{m} \quad \vec{n} \quad \vec{r}\right]\right|^2$ is equal to

A. 7

B. $\frac{21}{5}$

C. 5

D. $\frac{10}{3}$

Answer: C

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14. Let :

$P_1 : 3y + z + 1 = 0$ and $P_2 : 2x - y + 3z - 7 = 0$

and the equation of line AB is $\frac{x-1}{2} = \frac{y-3}{-1} = \frac{z-4}{3}$ in 3D space. Shortest distance between the line of intersection of planes P_1 and P_2 and the line AB is equal to

A. $\frac{7}{\sqrt{10}}$ units

B. $7\sqrt{\frac{2}{5}}$ units

C. $\frac{6}{\sqrt{10}}$ units

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

Answer: B

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15. Let $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$ and matrix B is defined such that $B = A + 3A^2 + 3A^3 + A^4$.

If $|B| = 8$ then the number of values of α in $[0, 10\pi]$ is

A. 10

B. 12

C. 5

D. 3

Answer: A

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16. $\sim(p \vee q) \vee (\sim p \wedge q)$ is equivalent to

A. p

B. $\sim p$

C. q

D. $\sim q$

Answer: B

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17. If the area of the rhombus enclosed by the lines $x \pm y \pm n = 0$ be 2 square units, then

A. $n^2 = 4$

B. $n^2 = 2$

C. $n^2 = \frac{1}{2}$

D. $n^2 = 1$

Answer: D

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18. The equation of a normal to the parabola $y = x^2 - 6x + 6$ which is perpendicular to the line joining the origin to the vertex of the parabola is

A. $4x - 4y - 11 = 0$

B. $4x - 4y + 1 = 0$

C. $4x - 4y - 21 = 0$

D. $4x - 4y + 21 = 0$

Answer: C

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19. If in the expansion of $\left(2^x + \frac{1}{4^x}\right)^n$, $\frac{T_3}{T_2} = 7$ and the sum of the co-efficients of $2nd$ and $3rd$ terms is 36, then the value of x is

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

B. $-\frac{1}{2}$

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

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

Answer: D

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20. Find x and y if

$$\left(x^4 + 2xi\right) - \left(3x^2 + yi\right) = (3 - 5i) + (1 + 2yi)$$

A. $x = 2, y = 3$

B. $x = -2, y = \frac{1}{3}$

C. $x = \pm 2$ and $y = 3, \frac{1}{3}$

D. None of these

Answer: C

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21. If $2f(x+y) = f(x).f(y)$ for all real x, y. where $f'(0) = 3$ and $f(4) = 25$, then the value of $f'(4)$ is equal to

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22. If the number of 7 digit numbers whose sum of the digits is equal to 10 and which is formed by using the digits 1, 2 and 3 only is K, then the value of $\frac{K+46}{100}$ is

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23. If the integral $I=\int e^{5\ln x}\left(x^6+1\right)^{-1}dx=\ln\left(x^6+1\right)+C,$

(where C is the constant of integration) then the value of $\frac{1}{\lambda}$ is

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24. Vipin and Shubham are playing a game with a coin, that comes up heads with a probability p. They take turns flipping the coin unitl one of them wins, with Vipin going first. Vipin wins if he flips heads and Shubham wins if the flips a heads and Shubham wins if he flips a tails. Given that the probability of Vipin winning the

game is $\frac{1}{2}$, then the value of p is $k\sin^2 162^\circ$. The value of $\frac{k}{10}$ is equal to

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25. If the cirlce $(x-a)^2+y^2=25$ intersects the circle $x^2+(y-b)^2=16$ in such way that the legnth of the common chord is 8 units, then the vlaue of a^2+b^2 is

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