MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 60

Mathematics

1. Find the coordinates the those point on the line $3x + 2y = 5$ which are equisdistant from the lines $4x + 3y - 7 = 0$ and $2y - 5 = 0$

A. $\left(-\frac{1}{14}, \frac{73}{28}\right)$

B. $\left(\frac{1}{14}, -\frac{73}{28}\right)$

C. $\left(\frac{1}{16}, -\frac{77}{32}\right)$

D. $\left(-\frac{1}{16}, \frac{77}{32}\right)$

Answer: A

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2. A man wants to distribute 101 coins a rupee each, among his 3 sons with the condition that no one receives more money than the

combined total of other two. The number of ways of doing this is :-

A. $.^{103}C_2 - 3.^{52}C_2$

B. $\frac{.^{103}C_2}{3}$

C. $\frac{.^{103}C_2}{6}$

D. $.^{103}C_2 - 3.^{50}C_3$

Answer: A

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3. If the sum of the first 100 terms of an arithmetic progression is -1 and the sum of the even terms is 1, then the 100^{th} term of the arithmetic progression is

A. $\frac{47}{25}$

B. $\frac{149}{50}$

C. $\frac{74}{25}$

D. $-\frac{149}{50}$

Answer: C

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4. The number of solutions of the equation $(\log_2 \cos\theta)^2 + \log_{\frac{4}{\cos\theta}}(16\cos\theta) = 2$ in the interval $[0, 2\pi)$ is

A. 1

B. 2

C. 3

D. 4

Answer: C

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5. Find the equation of the circle whose radius is $5 and$ which touches the circle $x^2 + y^2 - 2x - 4y - 20 = 0$ externally at the point $(5, 5)$.

A. $(x-9)^2 + (y+8)^2 = 25$

B. $(x-9)^2 + (y-8)^2 = 25$

C. $(x+8)^2 + (y+8)^2 = 25$

D. $(x+8)^2 + (y-9)^2 = 25$

Answer: B

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6. The value of the integral $\int_{-4}^{4} e^{|x|}\{x\}dx$ is equal to (where $\{.\}$ denotes the fractional part function)

A. e^4

B. $e^4 + 1$

C. $(e^4 - 1)$

D. e^2

Answer: C

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7. If $f: N \to Z$ defined as $f(n) = \begin{cases} \frac{n-1}{2} & : \text{if n is odd} \\ \frac{-n}{2} & : \text{if n is even} \end{cases}$ and $g: N \to N$ defined as $g(n) = n - (-1)^n$, then fog is (where, N is the set of natural numbers and Z is the set of integers)

A. one - one and onto

B. one - one and into

C. many - one and onto

D. many - one and into

Answer: A

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8. Which of the following is not a tautology?

A. $(p \wedge q) \rightarrow (p \vee q)$

B. $p \to (p \vee q)$

C. $q \to (p \to q)$

D. $p \to (p \wedge q)$

Answer: D

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9. If

$$y = \tan^{-1}.\frac{1}{1+x+x^2} + \tan^{-1}.\frac{1}{x^2+3x+3}$$

upto $+\tan^{-1}.\frac{1}{x^2+5x+7} + \ldots. + 2n$

terms $(\forall x \geq 0)$, then y(0) is

A. $\tan^{-1}(n)$

B. $\tan^{-1}(2n)$

C. $2\tan^{-1}(n)$

D. 0

Answer: B

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10. If the mean of a set of observations $x_1, x_2, \ldots\ldots, x_{10}$ is 40, then the mean of $x_1 + 4, x_2 + 8, x_3 + 12, \ldots\ldots\ldots, x_{10} + 40$ is

A. 54

B. 62

C. 38

D. 50

Answer: B

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11. The differential equation of the curve for which the point of tangency (closer to the x - axis) divides the segment of the tangent

between the coordinate axes in the ratio $1:2$, is

A. $xdy = 2ydx$

B. $xdy = ydx$

C. $xdy + 2ydx = 0$

D. $xdy + ydx = 0$

Answer: C

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12. The locus of the centre of the circle described on any focal chord of the parabola $y^2 = 4ax$ as the diameter is

A. $y^2 = 2a(x + a)$

B. $y^2 = a(x + a)$

C. $y^2 = 2a(x - a)$

D. $y^2 = 4a(x - a)$

Answer: C

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13. $\int \frac{\sin^8 x - \cos^8 x}{1 - 2\sin^2 x \cos^2 x} dx =$

A. $\frac{\sin 2x}{2} + C$

B. $-\frac{\sin 2x}{2} + C$

C. $\cos 2x + C$

D. $\frac{\cos x}{2} + C$

Answer: B

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14. Let

$$f(x) = \begin{vmatrix} 4x+1 & -\cos x & -\sin x \\ 6 & 8\sin\alpha & 0 \\ 12\sin\alpha & 16\sin^2\alpha & 1+4\sin\alpha \end{vmatrix}$$ and $f(0) = 0$. If the sum of all possible values of α is $k\pi$ for $\alpha \in [0, 2\pi]$, then the value of k is equal to

A. 2

B. 4

C. 6

D. 8

Answer: C

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15. $A, B, CandD$ are any four points in the space, then prove that $\left|\overrightarrow{A}B \times \overrightarrow{C}D + \overrightarrow{B}C \times \overrightarrow{A}D + \overrightarrow{C}A \times \overrightarrow{B}D\right| = 4$ (area of ABC .)

A. 2

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

C. 4

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

Answer: C

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16. 2 dice are thrown. Suppose a random variable X is assigned a value 2k, if the sum on the dice is equal to k, then the expected value of X is

A. 10

B. 12

C. 14

D. $\frac{50}{9}$

Answer: C

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17. The length of the perpendicular from P(1,0,2) on the line $\frac{x+1}{3} = \frac{y-2}{-2} = \frac{z+1}{-1}$ is

A. $\frac{3\sqrt{6}}{2}$ units

B. $\frac{6\sqrt{3}}{5}$ units

C. $3\sqrt{2}$ units

D. $2\sqrt{3}$ units

Answer: A

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18. Let there are exactly two points on the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ whose distance from (0,

0) are equal to $\sqrt{\frac{a^2}{2}+b^2}$. Then, the eccentricity of the ellipse is equal to

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

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

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

D. None of these

Answer: C

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19. The area (in sq. units) bounded by the curve $|y| = |\ln|x||$ and the coordinate axes is

A. 2

B. 4

C. 6

D. 8

Answer: B

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20. The volume of a cube is increasing at the rate of $9cm^3/\sec$. The rate $\left(\text{in } \ cm^2/\sec\right)$ at which the surface area is increasing when the edge of the cube is 9 cm, is

A. 1

B. 2

C. 3

D. 4

Answer: D

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21. Let M and N are two non singular matrices of order 3 with real entries such that $(adjM) = 2N$ and $(adjN) = M.$ If $MN = \lambda I$, then the value the values of λ is equal to (where, (adj X) represents the adjoint matrix of matrix X and I represents an identity matrix)

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22. The value of $\lim_{x \to 0} \frac{\ln(2 - \cos 15x)}{\ln^2(\sin 3x + 1)}$ is equal to

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23. If the number of terms in the expansion of $(1 + x)^{101}(1 + x^2 - x)^{100}$ is n, then the value of $\frac{n}{25}$ is euqal to

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24. If the function f(x), defined as

$$f(x) = \begin{cases} \frac{a(1-x\sin x)+b\cos x+5}{x^2} & : \quad x \neq 0 \\ 3 & : \quad x = 0 \end{cases}$$ is

continuous at $x = 0$, then the value of $\frac{b^4 + a}{5 + a}$ is equal to

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25. Let the points A, B, C and D are represented by complex numbers Z_1, Z_2, Z_3 and Z_4 respectively, If A, B and C are not collinear and

$2Z_1 + Z_2 + Z_3 - 4Z_4 = 0$, then the value of $\frac{\text{Area of } \Delta DBC}{\text{Area of } \Delta ABC}$ is equal to

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