MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 89

Mathematics

1. Let $f: R \to R$ be a function such that $f\left(\frac{x+y}{3}\right) = \frac{f(x)+f(y)}{3}$, $f(0) = 0$ and $f'(0) = 3$,then

A. $f(x)$ is a quadratic function

B. $f(x)$ is continuous but not differentiable

C. $f(x)$ is differentiable in R

D. $f(x)$ is bounded in R

Answer: C

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2. The value of definite integral $I = \int_{\ln\left(\frac{\sqrt{3}}{2}\right)}^{\ln\left(\frac{2}{\sqrt{3}}\right)} \ln.\left(\frac{2-\tan^7 x}{2+\tan^7 x}\right)dx$ is equal to

A. $\ln 4$

B. $\ln 2$

C. 0

D. $\ln\left(\frac{1}{2}\right)$

Answer: C

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3. A ladder rests against a vertical wall at an angle α to the horizontal. If the foot is pulled away through a distance 2m, then it slides a distance 5 m down the wall, finally making an angle β with the horizontal. The value of $\tan\left(\frac{\alpha+\beta}{2}\right)$ is equal to

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

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

C. 10

D. None of these

Answer: A

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4. If $x \in (0, 1)$, then the value of $2\tan^{-1}\left(\frac{1-x^2}{2x}\right) + 2\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ is equal to

A. $-\frac{\pi}{2}$

B. 0

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

D. π

Answer: D

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5. Let OABC be a regular tetrahedron with side length unity, then its volume (in cubic units) is

A. $3\sqrt{2}$

B. $6\sqrt{2}$

C. $\frac{1}{3\sqrt{2}}$

D. $\frac{1}{6\sqrt{2}}$

Answer: D

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6. Let $A(x_1, y_1), B(x_2, y_2), C(x_3, y_3)$ and $D(x_4, y_4)$ are four points which are at equal distance from the lines $3x - 4y + 1 = 0$ and $8x + 6y + 1 = 0$, The

mean of the coordinates of the centroids of $\Delta ABC, \Delta BCD, \Delta CDA$ and ΔDAB are

A. $\left(\frac{-4}{5}, \frac{2}{5}\right)$

B. $\left(\frac{-1}{5}, \frac{1}{10}\right)$

C. $\left(\frac{-3}{5}, \frac{3}{10}\right)$

D. $\left(\frac{-4}{15}, \frac{2}{15}\right)$

Answer: B

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7. If a, b, c are sides of the triangle ABC and $\begin{vmatrix} 1 & a & b \\ 1 & c & a \\ 1 & b & c \end{vmatrix} = 0$, then the value of $\cos 2A + \cos 2B + \cos 2C$ is equal to

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

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

C. $\frac{3\sqrt{3}}{2}$

D. -1

Answer: A

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8. The radius of circle, touching the parabola $y^2 = 8x$ at (2, 4) and passing through (0, 4), is

A. 1

B. 2

C. 4

D. 3

Answer: C

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9. Six married couple are sitting in a room. Number of ways in which 4 people can be selected so that there is exactly one married couple among the four is:

A. 276

B. 600

C. 840

D. 240

Answer: D

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10. A real value of a, for which the sum of the roots of the equation $x^2 - 2ax + 2a - 1 = 0$ is equal to the sum of the square of its roots, is

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

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

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

D. 2

Answer: A

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11. Sum of the first hundred numbers common to the arithmetic progression 12, 15, 18, ... and 17, 21, 25,..... Is

A. 56100

B. 65100

C. 61500

D. 51600

Answer: C

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12. $\frac{\sin(9\pi)}{14}\frac{\sin(11\pi)}{14}\frac{\sin(13\pi)}{14}$ is equal to

A. $\frac{1}{64}$

B. $-\frac{1}{64}$

C. $\frac{1}{8}$

D. $-\frac{1}{8}$

Answer: C

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13. The equation of the projection line of the line $\frac{x+1}{2} = \frac{y+1}{-1} = \frac{z+3}{4}$ on the plane $x + 2y + z = 6$ is

A. $\frac{x-1}{4} = \frac{y-3}{7} = \frac{z-1}{10}$

B. $\frac{x-1}{-4} = \frac{y+3}{7} = \frac{z-1}{10}$

C. $\frac{x-1}{4} = \frac{y-3}{-7} = \frac{z+1}{10}$

D. $\frac{x+3}{4} = \frac{y-2}{7} = \frac{z-7}{-10}$

Answer: C

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14. If the points $A:(0,a), B:(-2,0)$ and $C:(1,1)$ form an obtuse angle triangle (obtuse angled at angle A), then sum of all the possible integral values of a is

A. 0

B. 3

C. 2

D. 1

Answer: D

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15. Let A and B are square matrices of order 3 such that $AB^2 = BA$ and $BA^2 = AB.$ If $(AB)^2 = A^3B^n$, then m is equal to

A. 3

B. 4

C. 5

D. 7

Answer: D

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16. A hyperbola has foci $(4, 2), (2, 2)$ and it passess through $P(2, 4)$. The eccentricity of the hyperbola is

A. $\tan. \frac{3\pi}{10}$

B. $\tan. \frac{5\pi}{12}$

C. $\tan. \frac{\pi}{3}$

D. $\tan. \frac{3\pi}{8}$

Answer: D

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17. If $I_n = \int x^n e^{6x} dx$, then the expression $6I_{10} + 10I_9$ simplifies to (where, c is the constant of integration)

A. $x^{10}e^{5x} + c$

B. $x^{10}e^{6x} + c$

C. $x^9 e^{5x} + c$

D. $x^{10}e^{10x} + c$

Answer: B

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18. In an experiment with 10 observations on x the following results are available $\Sigma x^2 = 354$ and $\Sigma x = 58$. If one observation 8 that was found to be wrong and was replaced by the corrected value 10, then the corrected variance is

A. 5

B. 3

C. 4

D. 6

Answer: B

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19. If the area bounded by the curves $x^2 + y \leq 2$ and $y \geq x$ is $\frac{k}{2}$ sq. units, then 2k is equal to

A. 9

B. 27

C. 18

D. 32

Answer: C

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20. The solution of the differential equation $\frac{dx}{dy} = \frac{x^2}{e^y - x}(\forall x > 0)$ is $\lambda x + 2cx^2 e^y = e^y$ (where, c is an arbitrary constant). Then, λ is euqal to

A. 2

B. 4

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

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

Answer: A

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21. The vlaue of is

$$\lim_{x \to \frac{x}{2}} \left(1^{\frac{1}{\cos^2 x}} + 2^{\frac{1}{\cos^2 x}} + \ldots\ldots\ldots\ldots + 10^{\frac{1}{\cos^2 x}}\right)$$

equal to

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22. A fair coin is tossed repeatedly until two consecutive heads are obtained. If the probability that 2 consecutive heads occur on fourth and fifth toss is p, then $\frac{30}{p}$ is equal to

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23. Let λ denote the number of terms in the expansion of $\left(1+5x+10x^2+10x^3+5x^4+x^5\right)^{20}$. If unit's place and ten's place digits in 3^{λ} are O and T, then $O+T$ is equal to

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24. Let Z be a complex number satisfying the relation $Z^3+\frac{4\left(\overline{Z}\right)^2}{|Z|}=0$. If the least possible

argument of Z is $-k\pi$, then k is equal to (here, $arg Z \in (-\pi, \pi]$)

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25. If the product of height and square of the radius of the greatest cone obtained by rotating a right - angle triangle of hypotenuse 2 meters about a side is $\frac{k}{3\sqrt{3}}$, then k is equal to

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