MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 89

Mathematics

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

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

A. $\ln 4$

B. $\ln 2$

C. 0

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

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 $\tan\left(\dfrac{\alpha+\beta}{2}\right)$ is equal to

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

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

C. 10

D. None of these

Answer: A

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

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

B. 0

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

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. $\dfrac{1}{3\sqrt{2}}$

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

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 $\triangle ABC, \triangle BCD, \triangle CDA$ and $\triangle DAB$ are

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

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

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

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

Answer: B

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7. If a, b, c are sides of the triangle ABC and

$$\begin{vmatrix} 1 & a & b \\ 1 & c & a \\ 1 & b & c \end{vmatrix} = 0, \quad \text{then} \quad \text{the} \quad \text{value} \quad \text{of}$$

$\cos 2A + \cos 2B + \cos 2C$ is equal to

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

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

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

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. $\dfrac{1}{2}$

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

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

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

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

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

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

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

Answer: C

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

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

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

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

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

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

15. Let A and B are square matrices of order 3 such that $AB^2 = BA$ and $BA^2 = AB.$ If $(AB)^2 = A^3 B^n,$ 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. $\tan. \dfrac{3\pi}{10}$

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

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

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

Answer: D

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

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

A. 9

B. 27

C. 18

D. 32

Answer: C

20. The solution of the differential equation $\dfrac{dx}{dy} = \dfrac{x^2}{e^y - x}(\forall x > 0)$ 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. $\dfrac{1}{2}$

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

Answer: A

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

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 $\dfrac{30}{p}$ is equal to

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

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

argument of Z is $-k\pi$, then k is equal to (here,

$argZ \in (-\pi, \pi]$)

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 $\dfrac{k}{3\sqrt{3}}$, then k is equal to