MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 51

Mathematics

1. find the term independent of 'x' in the expansion of $\left(1+x+x^2\right)\left(\frac{3}{2}x^2-\frac{1}{3x}\right)^9$

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

B. $\frac{19}{54}$

C. $\frac{17}{54}$

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

Answer: C

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2. For a complex number Z, if the argument of $(Z-a)(\overline{Z}-b)$ is $\frac{\pi}{4}$ or $\frac{-3\pi}{4}$ (where a, b are two real numbers), then the value of ab such

that the locus of Z represents a circle with centre $\frac{3}{2}+\frac{i}{2}$ is (where, $i^2=-1$)

A. 1

B. 2

C. 3

D. 4

Answer: B

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3. The value of $\int \frac{(1-\cos\theta)^{\frac{3}{10}}}{(1+\cos\theta)^{\frac{13}{13}}} d\theta$ is equal to (where, c is the constant of integration)

A. $\frac{5}{8}(\tan\theta)^{\frac{5}{8}} + c$

B. $\frac{5}{8}\left(\tan.\frac{\theta}{2}\right)^{\frac{8}{5}} + c$

C. $\frac{5}{16}\left(\tan.\frac{\theta}{2}\right)^{\frac{8}{5}} + c$

D. $\frac{5}{8}(\tan\theta)^{\frac{5}{16}} + c$

Answer: B

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4. In an increasing geometric progression, the sum of the first and the last term is 99, the product of the second and the last but one term is 288 and the sum of all the terms is 189. Then, the number of terms in the progression is equal to

A. 5

B. 6

C. 7

D. 8

Answer: B

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5. The sum of the first 10 terms of the series $\frac{5}{1.2.3}+\frac{7}{2.3.9}+\frac{9}{3.4.27}+\ldots..$ is

A. $2+\frac{1}{3^{10}}$

B. $1+\frac{1}{11(3)^{10}}$

C. $2-\frac{1}{11(3)^{10}}$

D. $1-\frac{1}{11(3)^{10}}$

Answer: D

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6. If

$$\left|\sin^2 x + 10x^2\right| = \left|9 - x^2\right| + 2\sin^2 x + \cos^2 x$$

, then x lies in

A. $[-8.\ 8]$

B. $[-3, 3]$

C. $[-\sqrt{17}, \sqrt{17}]$

D. $[-\sqrt{21}, \sqrt{21}]$

Answer: B

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7. An isosceles triangle made of wood of base 10 feet and height 8 feet is placed vertically with its base on the ground and vertex directly above it. If the triangle faces the sun whose altitude is 30°, then the tangent of the angle at the apex of the shadow is

A. $\frac{80}{\sqrt{3}}$

B. $\frac{80\sqrt{3}}{167}$

C. $\frac{89}{2\sqrt{3}}$

D. $\frac{80\sqrt{3}}{217}$

Answer: B

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8. The mean deviation of the series $a^2, a^2+d, a^2+2d, \ldots\ldots, a^2+2nd$ from its median is

A. $\frac{(n+1)d}{(2n+1)}$

B. $\frac{nd}{2n+1}$

C. $\frac{n(n+1)d}{(2n+1)}$

D. $\frac{(2n+1)d}{n(n+1)}$

Answer: C

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9. The number of roots of the equation $\sin^{-1}x - \cos^{-1}x = \sin^{-1}(5x-3)$ is/ are

A. 3

B. 1

C. 2

D. 0

Answer: B

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10. The value of $\lim_{x \to 0} \frac{\ln\left(1 + 2x + 4x^2\right) + \ln\left(1 - 2x + 4x^2\right)}{\sec x - \cos x}$

is equal to

A. -1

B. 1

C. 0

D. 4

Answer: D

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11. The radius of a right circular cylinder increases at the rate of 0.2 cm/sec and the height decreases at the rate of 0.1 cm/sec. The rate of change of the volume of the cylinder when the radius is 1 cm and the height is 2 cm is

A. $\frac{\pi}{10} cm^3 / \sec$

B. $\frac{9\pi}{10} cm^3 / \sec$

C. $\frac{7\pi}{10} cm^3 / \sec$

D. $\frac{\pi}{5} cm^3 / \sec$

Answer: C

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12. If the graph of the function $y = (a-b)^2x^2 + 2(a+b-2c)x + 1(\forall a \neq b)$

A. $a < b < c$

B. $a < c < b$

C. $b < a < c$

D. $c < b < a$

Answer: B

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13. The value of $\int_{-\pi}^{\pi} \frac{\sqrt{2}\cos x}{1+e^x} dx$ is equal to

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

B. π

C. 0

D. 2π

Answer: C

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14. Let the tangents PQ and PR are drawn to $y^2 = 4ax$ from any point P on the line $x + 4a = 0$. The angle subtended by the chord of contact QR at the vertex of the parabola $y^2 = 4ax$ is

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

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

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

D. $\frac{\pi}{6}$

Answer: C

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15. Let $\vec{p} = \hat{i} + \hat{j} + \hat{k}$ are $\vec{r}$ be a variable vector such that $\vec{r} . \hat{i}$, $\vec{r} . \hat{j}$ and $\vec{r} . \hat{k}$ are even natural numbers. If $\vec{r} . \vec{p} \leq 20$, then the numbers. If $\vec{r} . \vec{p} \leq 20$ then the number of values of $\vec{r}$ is

A. 20

B. 60

C. 75

D. 120

Answer: D

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16. Let A, B and C are $n \times n$ matrices such that $|A| - 2, |B| = 3$ and $|C| = 5.$ If $\left|(2A)^2(3B)(5C)^{-1}\right| = \frac{1728}{125}$, then the value of n is equal to

A. 2

B. 3

C. 4

D. 6

Answer: A

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17. Given two independent events, if the probability that both the events occur is $\frac{8}{49}$, the probability that exactly one of them

occurs is $\frac{26}{49}$ and the probability of more probable of the two events is λ, then 14λ is equal to

A. 2

B. 4

C. 8

D. 7

Answer: C

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18. The number of integral value(s) of k such that the system of equations $kz - 2y - z = x, ky - z = z + 3x$ and $2x + kz = 2y - z$ has non - trivial solution, is/are

A. 0

B. 1

C. 2

D. 3

Answer: D

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19. The vertices of a triangle are the points $P(-26, 17), Q(30, 17)$ and $R(10, 2)$. If G and I be the centroid and incentre of the triangle PQR, then the value of $(GI)^2$ is equal to

A. $\frac{205}{9}$

B. $\frac{\sqrt{205}}{3}$

C. $3\sqrt{3}$

D. 27

Answer: A

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20. General solution of the differential equation $(\cos x)\frac{dy}{dx} + y.\sin x = 1$ is

A. $y = c\sin x + \cos x$

B. $y = \sin x + c\cos x$

C. $y = \tan x + c$

D. $y\sin x = \sin x + c$

Answer: B

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21. The sum of the y - intercepts of the tangents drawn from the point $(-2, -1)$ to the hyperbola $\frac{x^2}{3} - \frac{y^2}{2} = 1$ is

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22. In a class tournament where the participants were to play one game with one another, two of the class players fell ill, having played 3 games each. If the total number of games played is 24, then the number of participants at the beginning was

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23. The value of $\frac{\int_0^2 x^4\sqrt{4-x^2}dx}{\int_0^2 x^2\sqrt{4-x^2}dx}$ is equal to

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24. Let four circle having radii $r_1 = 5$ units, $r_2 = 5$ units, $r_3 = 8$ units and r_4 units $(r_4 < 5)$ are mutually touching each other externally, then the value of $\frac{2}{r_4}$ is equal to

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25. If the distance of point $P(3, 2, 6)$ from the line $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ measured

parallel to the plane $3x - 5y + 2z = 5$ is k, then then the value of k^2 is equal to

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