MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 99

Mathematics

1. If $f(x) = \begin{cases} \frac{5|x| + 4\tan x}{x} & x \neq 0 \\ k & x = 0 \end{cases}$, then $f(x)$ is continuous at x = 0 for

A. k = 9

B. $k = -1$

C. no value of k

D. $k = 2$

Answer: C

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2. For two statements p and q, the statement $\sim(p \vee (\sim q))$ is equivalent to

A. $\sim p \vee q$

B. $\sim p \wedge q$

C. $\sim p \vee \sim q$

D. $\sim p \wedge \sim q$

Answer: B

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3. The domain of the function $f(x) = \sqrt[4]{x - \sqrt{1 - x^2}}$ is

A. $\left[-1, \frac{-1}{\sqrt{2}}\right] \cup \left[\frac{1}{\sqrt{2}}, 1\right]$

B. $[-1, 1]$

C. $\left(-\infty, -\frac{1}{2}\right] \cup \left[\frac{1}{\sqrt{2}}, \infty\right)$

D. $\left[\frac{1}{\sqrt{2}}, 1\right]$

Answer: D

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4. A tower subtends an angle 75° at a point on the same level as the foot of the tower and at another point, 10 meters above the first, the angle of depression of the foot of the tower is 15°. The height of the tower is (in meters)

A. $10\left(\sqrt{3}+1\right)^2$

B. $10\left(\sqrt{3}-1\right)^2$

C. $10\left(2+\sqrt{3}\right)^2$

D. None of these

Answer: C

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5. The plane $\frac{x}{1}+\frac{y}{2}+\frac{z}{3}=1$ intersect x - axis, y - axis at A, B and C respectively. If the distance between the origin and the controid of ΔABC is k_1 units and the volume of the tetrahedron OABC is k_2 cubic units, then the value of $\frac{k_1^2}{k_2}$ is equal to (where O is the origin)

A. 21

B. $\frac{14}{9}$

C. 63

D. $\frac{14}{3}$

Answer: B

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6. Two circles have an external tangent with length 36 cm. The shortest distance between these circles is 14 cm. If the radius of the longer circle is 4 times the radius of the smaller circle then the radius of the larger circle in cms is

A. 12

B. 10

C. 14

D. 18

Answer: B

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7. If 4 letter words are formed using letters of the word 'MORADABAD'. Then the probability that D comes exactly once in the 4 letter word is

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8. The number of values of α in $[-10\pi, 10\pi]$ for which the equations

$(\sin\alpha)x - (\cos\alpha)y + 3z = 0, (\cos\alpha)x + (\sin\alpha)y - 2z = 0$

and $2x + 3y + (\cos\alpha)z = 0$ have nontrivial solution is

A. 10

B. 20

C. 40

D. 15

Answer: B

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9. The line joining $(5, 0)$ to $(10\cos\theta, 10\sin\theta)$ is divided internally in the ratio $2:3$ at P then the locus of P is

A. 4π units

B. 16π units

C. 16π units

D. 6π units

Answer: C

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10. Let $\vec{a} = \hat{i} - \hat{j} + \hat{k}$, $\vec{b} = 2\hat{i} + \hat{j} + \hat{k}$ and $\vec{c} = \hat{i} + \hat{j} - 2\hat{k}$, then the value of $\left[\vec{a} \quad \vec{b} \quad \vec{c}\right]$ is equal to

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11. Find the common tangent of $y = 1 + x^2$ and $x^2 + y - 1 = 0$. Also find their point of contact.

A. $(0, -4)$

B. $(0, -3)$

C. $(0, -1)$

D. $(0, 1)$

Answer: D

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12. For a complex number z, if $z^2 + \bar{z} - z = 4i$ and z does not lie in the first quadrant, then $(\text{where } i^2 = 1)$

A. $|z| = \sqrt{2}$

B. $|z| = 2\sqrt{2}$

C. $arg(z) = \frac{-\pi}{4}$

D. $arg(z) = \frac{3\pi}{4}$

Answer: A

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13. The solution of the differential equation $(1-x^2).\frac{dy}{dx}+xy=(x-x^3)y^{\frac{1}{2}}$, is $(\forall|x|<1)\sqrt{9y}=-f(x)=c(1-x^2)^{\frac{1}{4}}$, where c is an arbitrary constant and $f\left(\frac{1}{2}\right)=\frac{3}{4}$. Then $f(x)$ is

A. an odd function

B. an even function

C. a periodic function

D. symmetric about line x = 1

Answer: B

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14. If the equation $ax^2 + 2bx - 3c = 0$ has non real roots and $< a + b$ then c is always

A. $c < 0$

B. $c > 0$

C. $c = 0$

D. $a + 2b - 3c < 0$

Answer: A

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15. If

$$I = \int \frac{(\ln x)^5}{\sqrt{x^2 + x^2(\ln x)^3}} dx = k\sqrt{(\ln x)^3 + 1}\left((\ln x)^3 - 2\right) + c$$

(where c is the constant of integration), then 9k is equal to

A. 4

B. 2

C. 6

D. 10

Answer: B

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16. The function $f(x) = \pi x^3 - \frac{3\pi}{2}(a+b)x^2 + 3\pi abx$ has a local minimum at x = a, then the values a and b can take are

A. $a = \pi, b = e$

B. $a = e, b = \pi$

C. $a = b = \pi$

D. $a = b = e$

Answer: B

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17. The sum $\sum_{r=1}^{50} r.\left(2^r + 2^{50-r}\right)$ equals

A. $25\left(2^{50} - 1\right)$

B. $50\left(2^{50} - 1\right)$

C. $25\left(2^{51} - 1\right)$

D. $50\left(2^{51} - 1\right)$

Answer: D

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18. The number of five - digit telephone numbers having atleast one of their digits repeated is (00000 is also a telephone number)

A. 90000

B. 10000

C. 30240

D. 69760

Answer: D

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19. The limit $L = \lim_{n \to \infty} \Sigma_{r=4}^{n-4} \frac{n}{n^2 + r^2}$ satisfies the relation

A. $e^L > e$

B. $e^L > 3$

C. $e^{\tan L} < 2e$

D. $\frac{\pi}{L} < 1$

Answer: C

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20. The sum of the first three terms of an arithmetic progression is 9 and the sum of their squares is 35. The sum of the first n terms of the series can be

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21. The number of solution of the equation $\Sigma_{r=1}^{5}\cos(rx) = 0$ lying in $(0, \pi)$ is

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22. The marks obtained by 9 students in a chemistry test are $50, 69, 20, 33, 53, 39, 40, 65 \text{ and } 59$. If the mean deviation about the median of this data is λ, then the value of $\frac{9\lambda}{10}$ is equal to

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23. Let A and B are square matrices of order 3. If $|A| = 4, |B| = 6, B = A - 2I$ and $\left|adj\left(I - 2A^{-1}\right)\right| = k$, then the value of k is equal to

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24. Tangents are drawn from a point P to the hyperbola $\frac{x^2}{2} - y^2 = 1$ If the chord of contact is a normal chord, then locus of P is the curve $\frac{8}{x^2} - \frac{1}{y^2} = \lambda$ where $\lambda \in N$ .Find λ

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25. Let $A = x^4 + 4x^3 + 2x^2 - 4x + 7$ where $x = \cot. \frac{11\pi}{8}$ and $B = \frac{1 - \cos 8\theta}{\tan^2 4\theta} + \frac{1 + \cos 8\theta}{\cot^2 4\theta}$ where

$\theta = 9^\circ$, then the value of $\frac{A \times B}{2}$ is equal to

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