



MATHS

BOOKS - NTA MOCK TESTS

JEE MOCK TEST 9

Math

1. The length of the shadow of a vertical pole of height h , thrown by the sun's rays at three different moments are h , $2h$ and $3h$. Find the sum of the angles of elevation of the rays at these three moments.

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

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

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

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

Answer: A



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2. The function $f: \mathbb{R} \rightarrow \mathbb{R}$ is defined as $f(x) = 3^{-x}$. From the following statements,

I. f is one-one

II. f is onto

III. f is a decreasing function the true statements are

A. Only I,II

B. only II,III

C. only I,III

D. I,II,III

Answer: C



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3. If $f(x) = \begin{cases} x^p \cos\left(\frac{1}{x}\right) & x \neq 0 \\ 0 & x = 0 \end{cases}$ is differentiable at $x=0$,

then

A. $p < 0$

B. $0 < p < 1$

C. $p = 1$

$$D. p > 1$$

Answer: D



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4. If p : A man is happy and

q : A man is rich

Then, the statement "If a man is not happy, then he is not rich" is written as

A. $\sim p \rightarrow \sim q$

B. $\sim q \rightarrow p$

C. $\sim q \rightarrow \sim p$

D. $q \rightarrow \sim p$

Answer: A

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5. The general solution of the system of equation

$$\sin^3 x + \sin^3 \left(\frac{2\pi}{3} + x \right) + \sin^3 \left(\frac{4\pi}{3} + x \right) \quad \text{and}$$

$$+ \frac{3}{4} \cos 2x = 0 \cos x \neq 0 \text{ is}$$

A. $x = \frac{(2k + 1)\pi}{10}, k \in Z$

B. $x = \frac{(2k + 1)\pi}{5}, k \in Z$

C. $x = \frac{(4k + 1)\pi}{10}, k \in Z$

D. $x = \left(\frac{4k + 1}{5} \right) \pi, k \in Z$

Answer: C

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6. If $a + b + c > \frac{9c}{4}$ and quadratic equation $ax^2 + 2bx - 5c = 0$ has non-real roots, then-

A. $a > 0, c > 0$

B. $a > 0, c < 0$

C. $a < 0, c < 0$

D. $a < 0, c > 0$

Answer: B



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7. If $\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = 5$, then the value of

$$\Delta = \begin{vmatrix} b_2c_3 - b_3c_2 & a_3c_2 - a_2c_3 & a_2b_3 - a_3b_2 \\ b_3c_1 - b_1c_3 & a_1c_3 - a_3c_1 & a_3b_1 - a_1b_3 \\ b_1c_2 - b_2c_1 & a_2c_1 - a_1c_2 & a_1b_2 - a_2b_1 \end{vmatrix} \text{ is}$$

A. 5

B. 25

C. 125

D. 0

Answer: B



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8. The function $f(x) = \frac{x}{1 + |x|}$ is

- A. strictly increasing
- B. strictly decreasing
- C. neither increasing nor decreasing
- D. not differentiable at $x=0$

Answer: A

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9. Let $z \neq i$ be any complex number such that $\frac{z - i}{z + i}$ is a purely imaginary number. Then $z + \frac{1}{z}$ is

- A. any non-zero real number other than 1.
- B. a purely imaginary number.
- C. 0

D. any non-zero number

Answer: D



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10. The domain set of the function

$$f(x) = \tan^{-1} x - \cot^{-1} x + \cos^{-1}(2 - x) \text{ is}$$

A. [0,1]

B. [-1,1]

C. [1,3]

D. None of these

Answer: C





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11. The distance of the point $(1, 2, 3)$ from the plane $x + y - z = 5$ measured along the straight line $x = y = z$ is

A. $5\sqrt{3}$ units

B. $10\sqrt{3}$ units

C. $3\sqrt{3}$ units

D. $3\sqrt{5}$ units

Answer: A



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12. The number of rational point(s) (a point (a,b) is rational, if a and b both are rational numbers) on the circumference of a circle having centre (π, e) is

- A. at most one
- B. at least two
- C. exactly two
- D. infinite

Answer: A

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13. If the integral

$$\int \frac{5 \tan x}{\tan x - 2} dx = x + a \ln |\sin x - 2 \cos x| + k \text{ then } a \text{ is}$$

equal to

A. 1

B. 2

C. -1

D. -2

Answer: B



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14. If \vec{a} , \vec{b} , \vec{c} are non coplanar non-zero vectors such that $\vec{b} \times \vec{c} = \vec{a}$, $\vec{a} \times \vec{b} = \vec{c}$ and $\vec{c} \times \vec{a} = \vec{b}$, then

which of the following is not true

A. $|\vec{a}| = 1$

B. $\left[\vec{a} \ \vec{b} \ \vec{c} \right] = 1$

C. $|\vec{a}| + |\vec{b}| + |\vec{c}| = 3$

D. $|\vec{a}| \neq |\vec{b}| \neq |\vec{c}|$

Answer: D

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15. $\lim_{x \rightarrow 0} \frac{\log(1 + x + x^2) + \log(1 - x + x^2)}{\sec x - \cos x} =$

A. -1

B. 1

C. 0

D. 2

Answer: B



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16.

If

$$\begin{vmatrix} a^2 & b^2 & c^2 \\ (a + \lambda)^2 & (b + \lambda)^2 & (c + \lambda)^2 \\ (a - \lambda)^2 & (b - \lambda)^2 & (c - \lambda)^2 \end{vmatrix} = k\lambda \begin{vmatrix} a^2 & b^2 & c^2 \\ a & b & c \\ 1 & 1 & 1 \end{vmatrix} \lambda \neq 0$$

then k is equal to :

A. $4\lambda abc$

B. $-4\lambda^2$

C. $4\lambda^2$

D. $-4\lambda abc$

Answer: C

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17. The line $3x - 4y + 7 = 0$ is rotated through an angle $\frac{\pi}{4}$ in the clockwise direction about the point $(-1, 1)$. The equation of the line in its new position is

A. $7y + x - 6 = 0$

B. $7y - x - 6 = 0$

C. $7y + x + 6 = 0$

D. $7y - x + 6 = 0$

Answer: A

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18.

If

$$2y = \left(\cot^{-1} \left(\frac{\sqrt{3} \cos x + \sin x}{\cos x - \sqrt{3} \sin x} \right) \right)^2, \quad x \in \left(0, \frac{\pi}{2} \right) \quad \text{then} \quad \frac{dy}{dx}$$

is equal to

A. $\frac{\pi}{6} - x$

B. $2x - \frac{\pi}{3}$

C. $x - \frac{\pi}{6}$

D. $\frac{\pi}{3} - x$

Answer: C



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19. An experiment yield 3 mutually exclusive and exhaustive events A,B, and C. If $P(A) = 2P(B) = 3P(C)$, then P(A) is equal to

A. $\frac{1}{11}$

B. $\frac{2}{11}$

C. $\frac{3}{11}$

D. $\frac{6}{11}$

Answer: D



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20. The number of four-digit numbers formed by using the digits 0, 2, 4, 5 and which are not divisible by 5, is

A. 10

B. 8

C. 6

D. 4

Answer: B



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21. If the variance of the following data :
6,8,10,12,14,16,18,20,22,24 is K, then the value of $\frac{K}{11}$ is



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22. If the middle term in the binomial expansion of $\left(\frac{1}{x} + x \sin x\right)^{10}$ is $\frac{63}{8}$, then the value of $6 \sin^2 x + \sin x - 2$ is

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23. The area enclosed between the curves $y = ax^2$ and $x = ay^2$ ($a > 0$) is 1 sq. unit, value of a is

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24. The value of $\left[\int_{-\pi}^{\pi} \sqrt{\frac{|\sin y|}{1 + \tan^2 y}} dy \right]$ (where $[x]$ is greatest integer function) is

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25. Let $a_1, a_2, a_3, \dots, a_{11}$ be real numbers satisfying

$$a_1 = 15, 27 - 2a_2 > 0 \text{ and } a_k = 2a_{k-1} - a_{k-2} \quad \text{for}$$

$$k = 3, 4, \dots, 11. \text{ If } \frac{a_1^2 + a_2^2 + \dots + a_{11}^2}{11} = 90, \text{ then}$$

the value of $\frac{a_1 + a_2 + \dots + a_{11}}{11}$ is equal to



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