MATHS

NTA MOCK TESTS ENGLISH

JEE MOCK TEST 9

Math

1. The length of the shadow of a vertical pole of height h, thrown by the suns rays at three different moments are $h, 2hand3h$. 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 $f: R \to R$ 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. Show that the function $f(x) = \left\{ x^m \sin\left(\frac{1}{x}\right), x = 0, 0, \quad x \neq 0, \quad x = 0 \right.$ is differentiable at $x = 0$, if $m > 1$

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 $\sin^3 x + \sin^3\left(\frac{2\pi}{3} + x\right) + \sin^3\left(\frac{4\pi}{3} + x\right) + \frac{3}{4}\cos 2x = 0$ $\cos x \neq 0$ 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

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

$f(x) = \tan^{-1} x - \cot^{-1} x + \cos^{-1}(2 - x)$ 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 called rational, if $aandb$ both are rational numbers] on the circumference of a circle having center (π, e) is at most one (b) at least two exactly two (d) infinite

A. at most one

B. at least two

C. exactly two

D. infinite

Answer: A

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13. If the integral $\int \frac{5\tan x}{\tan x - 2} dx = x + a\ln|\sin x - 2\cos x| + k$ then a is equal to (1) -1 (2) -2 (3) 1 (4) 2

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. $\left|\vec{a}\right| = 1$

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

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

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

Answer: D

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15. $(\lim)_{x \to 0} \dfrac{\log\left(1 + x + x^2\right) + \log\left(1 - x + x^2\right)}{\sec x - \cos x} = -1$ (b)

1 (c) 0 (d) 2

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) $-4\lambda abc$ (C) $4\lambda^2$ (D) $-4\lambda^2$

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

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

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 yields 3 mutually exclusive and exclusive events A, B and C . If P(A) = 2P(B) = 3 P(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. If the area enclosed between the curves $y=ax^2 and x=ay^2(a>0)$ is 1 square unit, then find the value of a.

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24. Let $(a_1, a_2, a_3 \ldots\ldots, a_{11})$ be real numbers satsfying $a_1 = 15, 27 - 2a_2 > 0$ and $a_k = 2a_{k-1} - a_{k-2}$ for $k = 3, 4 \ldots\ldots, 11$, If $\frac{a_1^2 + a_2^2 + \ldots\ldots + a_{11}^2}{11} = 90$ then the value of $\frac{a_1 + a_2 + \ldots\ldots + a_1}{11}$ is equal to _____.

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