



## MATHS

### BOOKS - NTA MOCK TESTS

#### NTA JEE MOCK TEST 78

#### Mathematics

1. If the 6th term in the expansion of  $\left[ \frac{1}{x^{\frac{8}{3}}} + x^2 \log_{10} x \right]^8$  is 5600, then x

=

A. 2

B.  $\sqrt{5}$

C.  $\sqrt{10}$

D. 10

**Answer: D**



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2. A committee consisting of at least three members is to be formed from a group of 6 boys and 6 girls such that it always has a boy and a girl. The number of ways to form such committee is:  $(K + 2)$

A.  $2^{12} - 2^7 - 13$

B.  $2^{11} - 2^6 - 13$

C.  $2^{11} - 2^7 - 35$

D.  $2^{12} - 2^7 - 35$

**Answer: D**



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3.  $A$  is a square matrix of order  $3 \times 3$ . The matrices  $A$ ,  $4A^{-1}$ ,  $A^T$  all have the same value of the determinant. If  $(adjA) = 2A^T$ . then  $|3A^{-1}|$  is equal to

A.  $\frac{3}{2}$

B.  $\frac{9}{4}$

C.  $\frac{27}{8}$

D. 3

**Answer: C**



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4. The equation of a straight line passing through the point (3, 6) and cutting the curve  $y = \sqrt{x}$  orthogonally

A.  $4x + y - 18 = 0$

B.  $x + y - 9 = 0$

C.  $4x - y - 6 = 0$

D.  $x - y + 3 = 0$

**Answer: A**

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5. The value of  $\lim_{x \rightarrow 0} \left( \frac{1 + \tan x}{1 + \sin x} \right)^{\frac{2}{\sin x}}$  is equal to

A. 0

B. 1

C. -1

D. None of these

**Answer: A**

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6. If  $f(x) = \begin{cases} \frac{e^{\frac{2}{x}} - 1}{e^{\frac{2}{x}} + 1} & : x \neq 0 \\ 0 & : x = 0 \end{cases}$ , then  $f(x)$  is

- A. Continuous as well as differentiable at  $x = 0$
- B. Continuous but not differentiable at  $x = 0$
- C. Differentiable but not continuous at  $x = 0$
- D. None of these

**Answer: D**



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7. If  $\phi(x) = \log_8 \log_3 x$ , then  $\phi'(e)$  is equal to

- A.  $e \log 8$
- B.  $-e \log 8$
- C.  $\frac{1}{e \log 8}$
- D. None of these

**Answer: D**



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8. If the trigonometric equation  $\tan^{-1} x = 2 \sin^{-1} a$  has a solution, then the complete set of values of  $a$  is

A.  $\frac{1}{2} < |a| < \frac{1}{\sqrt{2}}$

B. all real values of  $a$

C.  $|a| < \frac{1}{2}$

D.  $|a| < \frac{1}{\sqrt{2}}$

**Answer: D**



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9. The negation of the statement "If I will become famous then I will open a school" is

- A. I will become famous and I will not open a school
- B. Either I will not become famous or I will not open a school.
- C. Neither I will not become nor I will open a school
- D. I will not become famous or I will open a school.

**Answer: A**

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10. A weighted coin with the probability of showing a head is  $\frac{2}{3}$  is tossed. If head appears, then a number is selected from the the first 20 natural numbers otherwise a number is selected from the first 9 natural numbers. The probability of getting an even number is

- A.  $\frac{1}{2}$
- B.  $\frac{13}{27}$
- C.  $\frac{10}{27}$
- D.  $\frac{5}{13}$

**Answer: B**



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11. If the volume of the parallelepiped formed by the vectors  $\vec{a} \times \vec{b}$ ,  $\vec{b} \times \vec{c}$  and  $\vec{c} \times \vec{a}$  is 36 cubic units, then the volume (in cubic units) of the tetrahedron formed by the vectors  $\vec{a} + \vec{b}$ ,  $\vec{b} + \vec{c}$  and  $\vec{c} + \vec{a}$  is equal to

A. 12

B. 6

C. 2

D. 1

**Answer: C**



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12. The system of equations  
 $kx + (k + 2)y + (k - 2)z = 0, (k + 2)x + ky + (k + 4)z = 0, (k - 2)x + (k + 2)y + (k + 4)z = 0$   
has a non-trivial solution for

- A. exactly one real value of  $k$
- B. exactly two real values of  $k$
- C. infinite real values of  $k$
- D. no real value of  $k$

**Answer: A**



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13. If  $f(x) = ax^2 + bx + c, f(-1) > \frac{1}{2}, f(1) < -1$  and  $f(-3) < -\frac{1}{2}$ , then

- A.  $a = 0$
- B.  $a < 0$

C.  $a > 0$

D. Sign of  $a$  can not be determined

**Answer: B**



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14. The function  $f(x) = 2 \sin x - e^x, \forall x \in [0, \pi]$  has

A. no local maximum

B. 2 local minima

C. 1 local maximum

D. 1 local minimum

**Answer: C**



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15. The area (in sq. units) bounded between  $y = 2x \ln x$  and  $y = -x$  from  $x = e$  to  $x = 2e$  is

A.  $e^e \ln(16)$

B.  $e^2 \ln(16e^3)$

C.  $e^3 \ln(16)$

D.  $e^3 \ln(16e^3)$

**Answer: B**



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16. A curve is such that the  $x$  - intercept of the tangent drawn to it the point  $P(x, y)$  is reciprocal of the abscissa of  $P$ . Then, the equation of the curve is (where,  $c$  is the constant of integration and  $x > 1$ )

A.  $y = c(x^2 - 1)$

B.  $y = c(x^2 + 1)$

$$C. y = c\sqrt{x^2 - 1}$$

$$D. \sqrt{y} = c\sqrt{x - 1}$$

**Answer: C**



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17. P lies on the line  $y = x$  and Q lies on  $y = 2x$ . The equation for the locus of the mid point of PQ, if  $|PQ| = 4$ , is  $25x^2 - \lambda xy + 13y^2 = 4$ , then  $\lambda$  equals

A.  $25x^2 + 36xy + 13y^2 = 4$

B.  $25x^2 - 36xy + 13y^2 = 4$

C.  $25x^2 - 36xy - 13y^2 = 4$

D.  $25x^2 + 26xy - 13y^2 = 4$

**Answer: B**



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18. The range of the function  $f(x) = \frac{\sin(\pi|x + 1|)}{x^4 + 1}$  (where  $[\cdot]$  is the greatest integer function) is

A.  $[0, 1]$

B.  $[-1, 1]$

C.  $\{0\}$

D. None of these

**Answer: C**



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19. The area of triangle formed by the lines  $x - y = 0$ ,  $x + y = 0$  and any tangent to the hyperbola  $x^2 - y^2 = 16$  is equal to

A. 2 sq. units

B. 4 sq. units

C. 8 sq. units

D. 16 sq. units

**Answer: D**



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**20.** For a complex number  $z$ , the product of the real parts of the roots of the equation  $z^2 - z = 5 - 5i$  is (where,  $i = \sqrt{-1}$ )

A.  $-25$

B.  $-6$

C.  $-5$

D.  $25$

**Answer: B**



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21. If the sum of the first  $n$  terms of an arithmetic progression, whose first term is the sum of the first  $n$  positive integers and whose common difference is  $n$ , is  $(8n^2 - 11n - 20)$ , then the sum of all the possible values of  $n$  is

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22. Given four points  $A(2, 1, 0)$ ,  $B(1, 2, 3)$ ,  $C(3, 1, 1)$  and  $D(0, 1, 3)$ . Point  $D$  lies on the line  $L$  which is perpendicular to the plane determined by the points  $A, B, C$ . If the point of intersection of the plane determined by the points  $A, B, C$  and the line  $L$  is  $(a, b, c)$ , then  $9(a + b + c)$  is equal to

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23. Each side of a square subtends an angle of  $60^\circ$  at the top of a tower 5 meters high standing at the center of the square. If  $a$  meters is the length of each side of the square, then  $a$  is equal to (use  $\sqrt{2} = 1.41$ )

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24. If the definite integral  $I = \int_0^\pi \sin[x] dx = \sum_{\varepsilon=0}^n a_\varepsilon \sin \varepsilon$ . (where,  $[.]$  is the greatest integer function), then the value of  $\frac{a_n + n}{\pi}$  is equal to

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25. If the minimum distance of the point  $(\sec \alpha, \operatorname{cosec} \alpha)$  from the circle  $x^2 + y^2 = 3$  can be expressed as  $A - \sqrt{b}$ , where  $a, b \in N$ , then the value of  $\frac{b}{a}$  is

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