



## MATHS

### BOOKS - NTA MOCK TESTS

#### NTA JEE MOCK TEST 98

#### Mathematics

1. The value of  $a$  for which twice the sum of the cubes of the roots of the equation  $a = \frac{x^2 - 3}{x - 2}$  attains its minimum value is (where,  $a \in [0, \pi]$ )

A. greater than 4

B. less than 2

C. greater than  $\frac{7}{4}$

D. less than 1

**Answer: C**

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2. If  $\int f(x) dx = 3[f(x)]^2 + c$  (where  $c$  is the constant of integration) and  $f(1) = \frac{1}{6}$ , then  $f(6\pi)$  is equal to

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

B.  $\pi$

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

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

**Answer: B**

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3. The equation of a circle with the origin as the centre and passing through the vertices of an equilateral triangle whose altitude is of length 3 units is

A.  $x^2 + y^2 = 9$

B.  $x^2 + y^2 = 16$

C.  $x^2 + y^2 = 4$

D.  $x^2 + y^2 = 1$

**Answer: C**



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4. Let  $A$  and  $B$  are  $3 \times 3$  matrices with real number entries, where  $A$  is symmetric,  $B$  is skew - symmetric and

$$(A + B)(A - B) = (A - B)(A + B). \quad \text{If}$$

$(AB)^T = (-1)^k AB$ , then the sum of all possible integral value of  $k$  in  $[2, 10]$  is equal to (where  $A^T$  represent transpose of matrix  $A$ )

A. 20

B. 24

C. 28

D. 45

**Answer: B**

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5. Coefficient of  $x^{48}$  in  $\sum_{r=0}^{50} {}^{50}C_r \cdot (x - 2)^x \cdot 3^{50-r}$  is

A.  ${}^{50}C_2$

B.  ${}^{48}C_2$

C.  $3^{48}$

D.  $2^{48}$

**Answer: A**

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6. If  $\alpha$  is a root of the equation  $4x^2 + 2x - 1 = 0$  and  $f(x) = 4x^2 - 3x + 1$ , then  $2(f(\alpha) + (\alpha))$  is equal to

A.  $-1$

B.  $0$

C.  $1$

D.  $2$

**Answer: C**



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7. A trapezium is formed by the pair of tangents of parabola  $P: y = \frac{x^2}{4} + 1$  drawn from the centre of the ellipse  $E: \frac{x^2}{4} + y^2 = \frac{1}{4}$ , tangent at the vertex of P and the tangent at end point of the minor axis of E. The area (in sq. units) of trapezium is

A.  $\frac{3}{4}$

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

C.  $\frac{3}{16}$

D.  $\frac{3}{8}$

**Answer: A**



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8. If  $A = \{\theta: 2 \cos^2 \theta + \sin \theta \leq 2\}$  , and

$B = \left\{ \theta: \frac{\pi}{2} \leq \theta \leq 3\frac{\pi}{2} \right\}$  , then the region for  $(A \cap B)$  is

A.  $\left\{ \theta: \frac{\pi}{2} \leq \theta \leq \frac{5\pi}{6} \right\}$

B.  $\left\{ \theta: \pi \leq \theta \leq \frac{3\pi}{2} \right\}$

C.  $\left\{ \theta: \frac{\pi}{2} \leq \theta \leq \frac{5\pi}{6} \right\}$  or  $\left\{ \theta: \pi \leq \theta \leq \frac{3\pi}{2} \right\}$

D.  $\left\{ \theta: \frac{3\pi}{4} \leq \theta \leq \frac{7\pi}{4} \right\}$

**Answer: C**



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9. If the function  $f(x) = \frac{(1-x)}{2} \tan. \frac{\pi x}{2}$  is continuous

at  $x = 1$ , then  $f(1)$  is equal to



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

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

C. 0

D.  $\pi$

**Answer: A**



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**10.** Consider the statement  $p$  : If slope of a straight line is 1 then it is equally inclined to both the axes.

Then, the contrapositive of the statement  $p$  is

A. If a straight line is equally inclined to both the axes then its slope is 1

- B. If a straight line is equally inclined to both the axes  
then its slope is not 1
- C. If a straight line is not equally inclined to both the  
axes then its slope is not 1
- D. If a straight line is not equally inclined to both the  
axes then its slope is 1

**Answer: C**

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11. The value of  $2 \sin^{-1} \frac{4}{5} + 2 \sin^{-1} \frac{5}{13} + 2 \sin^{-1} \frac{16}{65}$

is equal to

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

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

C.  $\pi$

D.  $2\pi$

**Answer: C**



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**12.** A balloon moving in a straight line passes vertically above two points A and B on a horizontal plane 10ft apart. When above A the balloon has an angle of elevation of  $60^\circ$  as seen from B. When above B it has an angle of

elevation of  $45^\circ$  as seen from A. The distance of B from the point C where it will touch the plane is

A.  $5(\sqrt{3} + 1)$  ft

B. 15 ft

C.  $5(3 + \sqrt{3})$  ft

D. None of these

**Answer: A**

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**13.** A line with gradient 2 intersects a line with gradient 6 at the point (40, 30). The distance between y - intercepts of these lines is

A. 160

B. 180

C. 108

D. 120

**Answer: A**

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**14.** If  $f(x)$  is a continuous function satisfying

$f(x) = f(2 - x)$ , then the value of the integral

$$I = \int_{-3}^3 f(1+x) \ln\left(\frac{2+x}{2-x}\right) dx \text{ is equal to}$$

A.  $3\pi$

B.  $6\pi$

C. 0

D.  $9\pi$

**Answer: C**



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**15.** The focus of the conic represented parametrically by the equation  $y = t^2 + 3, x = 2t - 1$  is



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16. The sum of infinite terms of the sequence whose  $r^{\text{th}}$  term is given by  $t_r = \frac{1}{(r+1)(r+3)}$  is equal to

A. 1

B. 2

C.  $\frac{3}{4}$

D.  $\frac{5}{12}$

**Answer: D**

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17. If the lines

$$\frac{x-1}{2} = \frac{y}{-1} = \frac{z}{2} \text{ and } x - y + z - 2 = 0 = \lambda x + 3z + 5$$

are coplanar, then the value of  $7\lambda$  is equal to

A. 31

B.  $-52$

C.  $-39$

D.  $-31$

**Answer: D**



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**18.** Five numbers are selected from 1, 2, 3, 4, 5, 6, 7, 8 and 9.

The probability that their product is divisible by 5 or 7 is

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



B.  $\frac{3}{4}$

C.  $\frac{5}{6}$

D.  $\frac{1}{6}$

**Answer: C**



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**19.** A curve is such that the slope of the tangent to it at any point P is the product of ordinate of P and abscissa increased by 2. If it passes through  $(-4, e)$ , then its equation is



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20. If  $A$  is an invertible square matrix of the order  $n$  such that  $|A| \neq 1$  and  $|\text{adj}(\text{adj}A)| = |A|^{(2n^2 - 7n + 7)}$  then the sum of all possible values of  $n$  is

A. 3

B. 4

C. 6

D. 5

**Answer: D**

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21. Let  $f(x)$  be a continuous and positive function, such that the area bounded by  $y = f(x)$ ,  $x$ -axis and the lines

$x^2 = 2ax$  is  $6a^2 + \sin a (\forall a > 0)$  sq. units. If  $f(\pi) = k\pi$ ,

then the value of  $k$  is equal to

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**22.** A committee of ten is to be formed from eight teachers and twelve students of whom four are girls. The number of committees which contains atleast four of either group (teachers and students) and atleast two girls and atleast two boys is equal to  $m$ . The number of prime factors of  $m$  is  $n$ , then  $(n)$  is equal to

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23. The value of  $\lim_{x \rightarrow 0^-} \frac{4^{\frac{3}{x}} + 15\left(2^{\frac{1}{x}}\right)}{2^{1+\frac{6}{x}} + 6\left(2^{\frac{1}{x}}\right)}$  is equal to

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24. If  $z_1$  and  $z_2$  are two distinct complex numbers satisfying the relation

$$|z_1^2 - z_2^2| = |\bar{z}_1^2 + \bar{z}_2^2 - 2\bar{z}_1\bar{z}_2| \text{ and } (\arg z_1 - \arg z_2) = \frac{a\pi}{b}$$

, then the least possible value of  $|a - b|$  is equal to (where, a & b are integers)

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25. Consider two vectors  $\vec{a} = 3\hat{i} - 2\hat{j} + 4\hat{k}$  and  $\vec{b} = \hat{j} + 2\hat{k}$ . If  $\vec{c}$  is a unit vector and  $k$  be the maximum value of  $a \cdot (\vec{b} \times \vec{c})$ , then the value of  $k^2 - 50$  is equal to

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