

## MATHS

### BOOKS - NTA MOCK TESTS

### NTA JEE MOCK TEST 70

#### Mathematics

1. The term independent of  $x$  in the expansion of

$$(1 - x)^2 \left( x + \frac{1}{x} \right), \text{ is}$$

A.  ${}^{10}C_5$

B.  ${}^{10}C_6$

C.  ${}^{11}C_5$

D.  ${}^{17}C_7$

**Answer: C**



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2. A box contains 2 white balls, 3 black balls and 4 red balls. The number of ways three balls be drawn from the box, if atleast one black ball is to be included in the draw is .....

A. 64

B. 74

C. 54

D. 84

**Answer: A**



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3. The area (in sq. units) bounded by

$y = |\ln x|$  from  $x = e$  to  $x = \pi$  with the x - axis is

A.  $\ln \pi$

B.  $\pi \ln \pi$

C.  $e \ln \pi$

D.  $\pi \ln \pi - \pi$

**Answer: D**



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4. If  $\cos x = \tan y$ ,  $\cos y = \tan z$  and  $\cos z = \tan x$ , then  $\sin x = 2 \sin \theta$  where  $\theta$  is (where,  $x, y, z, \theta$  are acute angles)

A.  $15^\circ$

B.  $18^\circ$

C.  $22\frac{1}{2}^\circ$

D.  $75^\circ$

**Answer: B**



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5. Let  $f(x)$  be a differentiable function on  $x \in \mathbb{R}$  such that  $f(x + y) = f(x) \cdot f(y)$  for all,  $x, y$ . If  $f(0) \neq 0$ ,  $f(5) = 12$  and  $f'(0) = 16$ , then  $f'(5)$  is equal to

A. 190

B. 186

C. 196

D. 192

**Answer: D**



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6. Let  $f: R \rightarrow B$ , be a function defined  $f(x) = \tan^{-1} \cdot \frac{2x}{\sqrt{3}(1+x^2)}$ , then f is both one - one

and onto when B, is the interval

A.  $\left(0, \frac{x}{6}\right)$

B.  $\left[0, \frac{\pi}{6}\right)$

C.  $\left[-\frac{\pi}{6}, \frac{\pi}{6}\right]$

D.  $\left(-\frac{\pi}{6}, \frac{\pi}{6}\right)$

**Answer: C**



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7. Mean deviation of the series  $a^2, a^2 + d, a^2 + 2d, \dots, a^2 + 2nd$  from its mean is

A.  $\frac{(n + 1)d}{(2n + 1)}$

B.  $\frac{nd}{2n + 1}$

C.  $\frac{n(n + 1)d}{(2n + 1)}$

D.  $\frac{(2n + 1)d}{n(n + 1)}$

**Answer: C**



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8. A tower leans towards west making an angle  $\alpha$  with the vertical. The angular elevation of B, the top most point of the tower, is  $75^\circ$  as observed from a point C due east of A at a distance of 20 units. If the angular elevation of B from a point due east of C at a distance of 20 units from C is  $45^\circ$ , then  $\tan \alpha$  is equal to

A.  $\frac{\sqrt{3} + 1}{2}$

B.  $\frac{\sqrt{3} + 1}{\sqrt{3} - 1}$

C.  $3 - 2\sqrt{3}$

D.  $\frac{\sqrt{3} - 1}{2}$

**Answer: C**



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9. The acute angle of intersection of the curves  $x^2y = 1$  and  $y = x^2$  in the first quadrant is  $\theta$ , then  $\tan \theta$  is equal to

A. 1

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

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

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

**Answer: D**



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10. Let  $I = \int \frac{dx}{1 + 3\sin^2 x} = \frac{1}{2} \tan^{-1}(2f(x)) + C$

(where, C is the constant of integration). If  $f\left(\frac{\pi}{4}\right) = 1$ ,

then the fundamental period of  $y = f(x)$  is

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

B.  $\pi$

C.  $2\pi$

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

**Answer: B**



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11. Let  $a, b, c$  and  $d$  are in a geometric progression such that  $a < b < c < d, a + d = 112$  and  $b + c = 48$ . If the geometric progression is continued with  $a$  as the first term, then the sum of the first six terms is

A. 1156

B. 1256

C. 1356

D. 1456

**Answer: D**



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12. The solution of the differential equation  $\sin ye^x dx - e^x \cos y dy = \sin^2 y dx$  is (where,  $c$  is an arbitrary constant)

A.  $e^x \sin y = x + c$

B.  $e^x = (x + c)\sin y$

C.  $e^x \cdot x = \sin y + c$

D.  $e^x \cdot \sin y = x^2 + c$

**Answer: B**



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13. If  $\vec{a}$ ,  $\vec{b}$ ,  $\vec{c}$  be three units vectors perpendicular to each other, then

$$\left| \left( 2\vec{a} + 3\vec{b} + 4\vec{c} \right) \cdot \left( \vec{a} \times \vec{b} + 5\vec{b} \times \vec{c} + 6\vec{c} \times \vec{a} \right) \right|$$

is equal to

A. 18

B. 0

C. 4

D. 32

**Answer: D**



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14. Let  $A = (a_{ij})_{3 \times 3}$  and  $B = (b_{ij})_{3 \times 3}$ , where  $b_{ij} = \frac{a_{ij} + a_{ji}}{2}$ . Number of such matrices  $A$  whose elements are selected from the set  $\{0, 1, 2, 3\}$  such that  $A = B$ . Are

A.  $2^9$

B.  $2^{12}$

C.  $2^6$

D.  $2^8$

**Answer: B**



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15. A line passes through the point  $A(2, 3, 5)$  and is parallel to the vector  $2\hat{i} - \hat{j} + \hat{k}$ . If P is a point on this line such that  $AP = 2\sqrt{6}$ , then the coordinates of point P can be

A.  $(4, 2, 6)$

B.  $(6, 1, 7)$

C.  $(-2, 5, -3)$

D.  $(2, 3, 5)$

**Answer: B**



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16. Let PQ be the common chord of the circles

$$S_1: x^2 + y^2 + 2x + 3y + 1 = 0 \quad \text{and}$$

$$S_2: x^2 + y^2 + 4x + 3y + 2 = 0, \text{ then the perimeter (in}$$

units) of the triangle  $C_1PQ$  is equal to

$$\left( \text{where, } C_1 = \left( -1, \frac{-3}{2} \right) \right)$$

A.  $\frac{9}{2}$

B.  $2\sqrt{2} + 3$

C.  $3\sqrt{2} + 3$

D.  $\frac{3}{2} + 2\sqrt{2}$

**Answer: B**



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17. If the segment intercepted between the lines  $x + 6y - 13 = 0$  and  $x - y + 3 = 0$  is bisected at  $(6, 8)$ , then the square of the length of segment is

A. 268

B. 244

C. 212

D. 252

**Answer: B**



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18. If  $A$  and  $B$  are square matrices such that  $A^{2020} = O$  and  $AB = A + B$ , then  $|B|$  is equal to (where,  $O$  is a null matrix)

A. 0

B. 1

C.  $-1$

D. 4

**Answer: A**



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19. Variable ellipses are drawn with  $x = -4$  as a directrix and origin as corresponding foci. The locus of extremities of minor axes of these ellipses is:

A. 1

B. 2

C.  $\sqrt{2}$

D.  $\frac{1}{2}$

**Answer: A**



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20. Let the locus of any point  $P(z)$  in the argand plane is

$$\arg\left(\frac{z - 5i}{z + 5i}\right) = \frac{\pi}{4}. \text{ If } O \text{ is the origin, then the value of } \frac{\max . (OP) + \min . (OP)}{2} \text{ is}$$

A.  $5\sqrt{2}$

B.  $5 + \frac{5}{\sqrt{2}}$

C.  $5 + 5\sqrt{2}$

D.  $10 - \frac{5}{\sqrt{2}}$

**Answer: B**



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21. The number of values of  $x$  lying in the interval  $-(2\pi, 2\pi)$  satisfying the equation  $1 + \cos 10x \cos 6x = 2 \cos^2 8x + \sin^2 8x$  is equal to

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22. If  $[\sin^{-1} x]^2 + [\sin^{-1} x] - 2 \leq 0$  (where,  $[.]$  represents the greatest integral part of  $x$ ), then the maximum value of  $x$  is

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23. If  $I = \int_0^{16} \frac{x^{\frac{1}{4}}}{1 + \sqrt{x}} dx = k + 4 \tan^{-1} m$ , then

$3k - m$  is equal to



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24. There are two red, two blue, two white, and certain number (greater than 0) of green socks in a drawer. If two socks are taken at random from the drawer without replacement, the probability that they are of the same color is  $\frac{1}{5}$ , then the number of green socks are \_\_\_\_\_.



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25. A circle is drawn whose centre is on the  $x$  - axis and it touches the  $y$  - axis. If no part of the circle lies outside the parabola  $y^2 = 8x$ , then the maximum possible radius of the circle is



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