

**MATHS****BOOKS - NTA MOCK TESTS****JEE MOCK TEST 3****Mathematics**

1. The probability distribution of a random variable  $X$  is given as

$X$	-5	-4	-3	-2	-1	0	1	2	3	4	5
$P(X)$	$p$	$2p$	$3p$	$4p$	$5p$	$7p$	$8p$	$9p$	$10p$	$11p$	$12p$

Then, the value of  $p$  is

A.  $\frac{1}{72}$

B.  $\frac{3}{73}$

C.  $\frac{5}{72}$

D.  $\frac{1}{74}$

**Answer: A**



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2. The lengths of two adjacent sides of a cyclic quadrilateral are 2 units and 5 units and the angle between them is  $60^\circ$ . If the area of the quadrilateral is  $4\sqrt{3}$  sq. units, then the perimeter of the quadrilateral is

A. 12.5 units

B. 13 units

C. 13.2 units

D. 12 units

**Answer: D**



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3. If  $f(x) = \cos(\log x)$ , then  $f(x)f(y) - \frac{1}{2} \left[ f\left(\frac{x}{y}\right) + f(xy) \right] =$

A.  $-1$

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

C.  $-2$

D.  $0$

**Answer: D**



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4. The coefficient of the term independent of  $x$  in  $\left[ \sqrt{\left(\frac{x}{3}\right)} + \frac{\sqrt{3}}{x^2} \right]^{10}$  is

A.  $\frac{5}{3}$

B.  $\frac{4}{5}$

C.  $6$

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

**Answer: A**



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5. The area bounded by  $y = xe^{|x|}$  and the lines  $|x| = 1, y = 0$  is

- A. 4 sq units
- B. 6 sq units
- C. 1 sq units
- D. 2 sq units

**Answer: D**



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6. Minimum distance between the curves  $y^2 = x - 1$  and  $x^2 = y - 1$  is equal to:

- A.  $\frac{3\sqrt{2}}{4}$  units
- B.  $\frac{5\sqrt{2}}{4}$  units

C.  $\frac{7\sqrt{2}}{4}$  units

D.  $\frac{\sqrt{2}}{4}$  units

**Answer: A**



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7. The integral  $\int_{-\frac{1}{2}}^{\frac{1}{2}} \left( [x] + \log\left(\frac{1+x}{1-x}\right) \right) dx$  equals to ( $[x]$  is the greatest integer  $\leq x$ )

A.  $-\frac{1}{2}$

B. 1

C.  $2 \ln\left(\frac{1}{2}\right)$

D. 0

**Answer: A**



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8. How many words, with or without meaning can be made from the letters of the word MONDAY, assuming that no letter is repeated, if 4 letters are used at a time?

A. 360

B. 350

C. 400

D. 390

**Answer: A**



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9. If  $f(x + y, x - y) = xy$ , then the arithmetic mean of  $f(x, y)$  and  $f(y, x)$  is

A.  $x$

B.  $y$

C. 0

D.  $\frac{x^2 - y^2}{2}$

**Answer: C**



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10. Find the real values of  $x$  and  $y$  satisfying the equation :

$$\frac{(1+i)x - 2i}{3+i} + \frac{(2-3i)y + i}{3-i} = i$$

A.  $x = -1, y = 3$

B.  $x = 3, y = -1$

C.  $x = 0, y = 1$

D.  $x = 1, y = 0$

**Answer: B**



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11. Tangent to a curve intercepts the  $y$ -axis at a point  $P$ . A line perpendicular to this tangent through  $P$  passes through another point  $(1,0)$ . The differential equation of the curve is

A.  $y \frac{dy}{dx} - x \left( \frac{dy}{dx} \right)^2 = 1$

B.  $x \frac{d^2y}{dx^2} + \left( \frac{dy}{dx} \right)^2 = 1$

C.  $y \frac{dx}{dy} + x = 1$

D. None of these

**Answer: A**



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12. If  $m$  is a positive integer and

$$\Delta_r = \begin{vmatrix} 2r - 1 & m C_r & 1 \\ m^2 - 1 & 2^m & m + 1 \\ \sin^2(m^2) & \sin^2(m) & \sin^2(m + 1) \end{vmatrix}, \text{ then the value of } \sum_{r=0}^m \Delta_r \text{ is}$$

A. 1



B. 3

C. 2

D. 0

**Answer: D**



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**13.**

**If**

$$\alpha = \sin^{-1}\left(\frac{\sqrt{3}}{2}\right) + \sin^{-1}\left(\frac{1}{3}\right), \beta = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right) + \cos^{-1}\left(\frac{1}{3}\right)$$

**then**

A.  $\alpha > \beta$

B.  $\alpha = \beta$

C.  $\alpha < \beta$

D.  $\alpha + \beta = 2\pi$

**Answer: C**



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14. The logically equivalent proposition of  $p \leftrightarrow q$  is

A.  $(p \wedge q) \vee (p \wedge q)$

B.  $(p \rightarrow q) \wedge (q \rightarrow p)$

C.  $(p \wedge q) \vee (q \rightarrow p)$

D.  $(p \wedge q) \rightarrow (q \vee p)$

Answer: B



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15. If  $\log_{10} \left( \frac{x^3 - y^3}{x^3 + y^3} \right) = 2$ , then  $\frac{dy}{dx} =$

A.  $\frac{x}{y}$

B.  $-\frac{y}{x}$

C.  $-\frac{x}{y}$

D.  $\frac{y}{x}$

**Answer: D**



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**16.** If A is the set of even natural number less than 8 and B is the set of prime numbers less then 7, then the number of relations from A to B is

A.  $2^9$

B.  $9^2$

C.  $3^2$

D.  $2^{9-1}$

**Answer: A**



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17. For real  $x$ , the function  $\frac{(x-a)(x-b)}{x-c}$  will assume all real values provided

A.  $a > b > c$

B.  $a < b < c$

C.  $a > c > b$

D.  $a \leq c \leq b$

**Answer: D**



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18.  $OPQR$  is a square and  $M, N$  are the middle points of the sides  $PQ$  and  $QR$  respectively. Then the ratio of the area of the square to that of triangle  $OMN$  is

A. 4:1

B. 2:1

C. 8:3

D. 7:3

**Answer: C**

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19.  $\int \frac{\sin^4 x}{\cos^8 x} dx$

A.  $\left( \frac{1 + \tan^5 x}{5} \right) + \frac{\tan^5 x}{7} + C$

B.  $\frac{\tan^5 x}{5} + \frac{\tan^7 x}{7} + C$

C.  $\frac{\tan^7 x}{5} + \frac{\tan^5 x}{7} + C$

D. None of these

**Answer: B**

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20. If  $x = 3$  is the chord of the contact of the circle  $x^2 + y^2 = 81$ , then the equation of the corresponding pair of tangents, is

A.  $x^2 + 8y^2 + 54x + 729 = 0$

B.  $x^2 - 8y^2 - 54x + 729 = 0$

C.  $x^2 - 8y^2 - 54x - 729 = 0$

D.  $x^2 - 8y^2 = 729$

**Answer: B**



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21. The number of solutions, the equation  $\sin^4 x + \cos^4 x = \sin x \cos x$  has, in  $[\pi, 5\pi]$  is/are



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22. A tower subtends angles  $\alpha$ ,  $2\alpha$ ,  $3\alpha$  respectively, at point  $A$ ,  $B$ , and  $C$  all lying on a horizontal line through the foot of the tower. If  $\frac{AB}{BC} = 1 + p \cos(p\alpha)$ . then the value of  $p$



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23.

Let

$$y = \sin^{-1}(\sin 8) - \tan^{-1}(\tan 10) + \cos^{-1}(\cos 12) - \sec^{-1}(\sec 9) + \cot^{-1}(\cot 11)$$

. If  $y$  simplifies to  $a\pi + b$ , then find  $(a - b)$ .



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24. Let  $\alpha$  and  $\beta$  be two number where  $\alpha < \beta$  The geometric mean of these numbers exceeds the smaller  $\alpha$  by 12 and the arithmetic mean of the same number is smaller by 24 than the larger number  $\beta$ , then the value of  $|\beta - \alpha|$  is



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25. The value of  $f(0)$ , so that the function

$$f(x) = \frac{1 - \cos(1 - \cos x)}{x^4}$$
 is continuous everywhere is  $k$ , then value of

$10k$  is



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