



## MATHS

### BOOKS - NTA MOCK TESTS

### JEE MOCK TEST 7

#### Mathematics Single Choice

1. If  $\log(x + y) = 2xy$ , then  $y'(0)$  is

A. 1

B. -1

C. 2

D. 0

**Answer: A**



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2. The value of the parameter  $a$  such that the area bounded by  $y = a^2x^2 + ax + 1$ , coordinate axes, and the line  $x=1$  attains its least value is equal to

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

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

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

D.  $-1$

**Answer: C**



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3.  $\int(\sqrt{\tan x} + \sqrt{\cot x}) dx$  is equal to

A.  $\sqrt{2} \sin^{-1}(\sin x + \cos x) + C$

B.  $\sqrt{2} \cos^{-1}(\sin x - \cos x) + C$

C.  $\sqrt{2} \sin^{-1}(\sin x - \cos x) + C$

D.  $\sqrt{2} \cos^{-1}(\sin x + \cos x) + C$

**Answer: C**



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**4. Digit at the units place of sum of**

$(1!)^2 + (2!)^2 + (3!)^2 \dots\dots + (2008!)^2$  is

A. 5

B. 7

C. 9

D. 6

**Answer: B**



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5. Let  $a, b, c$ , be any real number. Suppose that there are real numbers  $x, y, z$  not all zero such that  $x = cy + bz$ ,  $y = az + cx$  and  $z = bx + ay$ .

Then

$a^2 + b^2 + c^2 + 2abc$  is equal to

A. 1

B. 2

C. -1

D. 0

**Answer: A**



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6. If  $f(x) = \sin\left(\lim_{t \rightarrow 0} \frac{2x}{\pi} \cot^{-1}\left(\frac{x}{t^2}\right)\right)$ , then

$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} f(x) dx$  is equal to (where,  $x \neq 0$ )

A. -2

B.  $-1$

C.  $0$

D.  $2$

**Answer: B**



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7. If  $p \rightarrow (\sim p \vee q)$  is false, then the truth values of  $p$  and  $q$  are respectively

A. F,T

B. F,F

C. T,T

D. T,F

**Answer: D**



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**8.** A foot of the normal from the point  $(4, 3)$  to a circle is  $(2, 1)$  and a diameter of the circle has the equation  $2x - y - 2 = 0$ . Then the equation of the circle is:

A.  $x^2 + y^2 - 4y + 2 = 0$



$$B. x^2 + y^2 - 4y + 1 = 0$$

$$C. x^2 + y^2 - 2x - 1 = 0$$

$$D. x^2 + y^2 - 2x + 1 = 0$$

**Answer: C**



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**9.** If  $x$  is rational and

$$4\left(x^2 + \frac{1}{x^2}\right) + 16\left(x + \frac{1}{x}\right) - 57 = 0, \text{ then}$$

the product of all possible values of  $x$  is

**A. 4**

B. 3

C. 2

D. 1

**Answer: D**



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**10.** Mean and variance of 20 observation are 10 and 4. It was found, that in place of 11, 9 was taken by mistake find correct variance.

A. 3.99

B. 4.01

C. 4.02

D. 3.98

**Answer: A**



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**11.** Sum of first 20 terms of

$$\frac{3}{1^2} + \frac{5}{1^2 + 2^2} + \frac{7}{1^2 + 2^2 + 3^2} + \dots \text{ upto 20 terms}$$

is  $\frac{k}{21}$ , then k is equal to :

A. 240

B. 120

C. 60

D. 80

**Answer: B**



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**12.** if  $\tan(k+1)\theta = \tan \theta$ , then  $\theta$  belongs to the set

A.  $\{n\pi : n \in I\}$

B.  $\left\{\frac{n\pi}{2} : n \in I\right\}$

C.  $\left\{ \frac{n\pi}{k} : n \in I \right\}$

D.  $\left\{ \frac{n\pi}{4} : n \in I \right\}$

**Answer: C**



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**13.** If  $z + \frac{1}{z} + 1 = 0$ , then  $z^{2003} + \frac{1}{z^{2003}}$  is equal to

A. 1

B. -1

C. 0

D. None of these

**Answer: B**



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**14.** When the elevation of the sun changes from  $45^\circ$  to  $30^\circ$ , the shadow of a tower increases by 60 units then the height of the tower is

A.  $30\sqrt{3}$  units

B.  $30\sqrt{2}$  units

C.  $30(\sqrt{3} + 1)$  units

D.  $30(\sqrt{2} + 1)$  units

**Answer: C**



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

A.  $e^{-1/3}$

B.  $e^{-2/3}$

C.  $e^{-1}$

D.  $e^{-2}$

**Answer: B**



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**16.** If  $f(x) = \sin x + \cos x$  and  $g(x) = x^2 - 1$ , then  $g(f(x))$  is invertible in the domain .

A.  $\left[0, \frac{\pi}{2}\right]$

B.  $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$

C.  $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

D.  $[0, \pi]$

**Answer: B**





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17.

For

$x \in \mathbb{R}$ ,  $f(x) = |\log 2 - \sin x|$  and  $g(x) = f(f(x))$ ,

then

A.  $g'(0) = -\cos(\log 2)$

B.  $g$  is not differentiable at  $x = 0$

$g'(0) = -\sin(\log 2)$

C.  $g$  is not differentiable at  $x = 0$

D.  $g'(0) = \cos(\log)2$

Answer: D



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18. The differential equation obtained by eliminating the arbitrary constants  $a$  and  $b$  from

$$xy = ae^x + be^{-x} \text{ is}$$

A.  $x \frac{d^2y}{dx^2} + 2 \frac{dy}{dx} - xy = 0$

B.  $\frac{d^2y}{dx^2} + 2 \frac{dy}{dx} - xy = 0$

C.  $\frac{d^2y}{dx^2} + 2 \frac{dy}{dx} + xy = 0$

D.  $\frac{d^2y}{dx^2} + \frac{dy}{dx} - xy = 0$

**Answer: A**



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**19.** A relation  $R$  is defined from  $\{2, 3, 4, 5\}$  to  $\{3, 6, 7, 10\}$  by :  $x R y \Rightarrow x$  is relatively prime to  $y$ . Then, domain of  $R$  is

A.  $\{2, 3, 5\}$

B.  $\{3, 5\}$

C.  $\{2, 3, 4\}$

D.  $\{2, 3, 4, 5\}$

**Answer: D**



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**20.** Solution set of  $[\sin^{-1} x] > [\cos^{-1} x]$ . where

$[\cdot]$  denotes greatest integer function

A.  $\left[ \frac{1}{\sqrt{2}}, 1 \right]$

B.  $(\cos 1, \sin 1)$

C.  $[\sin 1, 1]$

D. None of these

**Answer: C**



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## Mathematics Subjective Numerical

1. If  $f(x) = \cos|x| - 2ax + b$  is a function, which increases for all  $x$ , then the maximum value of  $2a + 1$  is



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2. Find the distance of the point  $(-1, -5, -10)$  from the point of intersection of the line  $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-2}{12}$  and plane  $x - y + z = 5$ . is  $13t$ , then the value of  $t$  equals to



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3. The sum of the binomial coefficients in the expansion of  $\left(x^{-\frac{3}{4}} + ax^{\frac{5}{4}}\right)^n$  lies between 200 and 400 and the term independent of  $x$  equals 448. The value of  $a$  is :-



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4. A biased coin with probability  $P$ , ( $0 < p, 1$ ) of heads is tossed until a head appear for the first time. If the probability that the number of tosses required is even is  $\frac{2}{5}$  then  $p =$



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5. If the straight line drawn through the point  $P(\sqrt{3}, 2)$  and making an angle  $\frac{\pi}{6}$  with the x-axis

meets the line  $\sqrt{3}x - 4y + 8 = 0$  at Q, find the length of PQ.



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