



MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 31

Mathematics

1. Let A be the set of values of k for which 2 lies between the roots of the quadratic equation

$x^2 + (k + 2)x - (k + 3) = 0$, then A is given

by

A. $(-\infty, -5)$

B. $(5, \infty)$

C. $(-\infty, -5]$

D. $[5, \infty)$

Answer: A



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2. Two poles standing on horizontal ground are of heights 10 meters & 40 meters respectively. The line joining their tops makes an angle of 30° with the ground. The distance (in meters) between the foot of the poles is

A. 20

B. 30

C. $20\sqrt{3}$

D. $30\sqrt{3}$

Answer: D



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3. If in triangle ABC , $A \equiv (1, 10)$, circumcentre $\equiv \left(-\frac{1}{3}, \frac{2}{3}\right)$ and orthocentre $\equiv \left(\frac{11}{3}, \frac{4}{3}\right)$ then the co-ordinates of mid-point of side opposite to A is $\left(1, -\frac{11}{3}\right)$ (b) $(1, 5)$ (c) $(1, -3)$ (d) $(1, 6)$

A. $\left(1, \frac{-11}{3}\right)$

B. $\left(1, \frac{-22}{3}\right)$

C. $\left(2, \frac{-11}{3}\right)$

D. $\left(-1, \frac{11}{3}\right)$

Answer: A



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4. The means of two samples of size 40 and 50 were found to be 54 and 63 respectively. Their standard deviations were 6 and 9 respectively. The variance of the combined sample of size 90 is

A. 90

B. 7

C. 9

D. 81

Answer: D



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5.

if

$$f(\tan x) = \sin 2x : x \neq (2n + 1)\frac{\pi}{2}, n \in I$$

then which of the following is an incorrect statement?

A. Domain of $f(x)$ is

$$r - (2n + 1)\frac{\pi}{2}, n \in I$$

B. Range of $f(x)$ is $[-1, 1]$

C. $f(x)$ is odd function

D. $f(x)$ is many - one function

Answer: A



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6. The area bounded by the curve $y = x^2(x - 1)^2$ with the x - axis is k sq. units.

Then the value of 60 k is equal to

A. 1

B. 2

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

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

Answer: B



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7. Let $O = (0, 0)$, $A = (3, 0)$, $B = (0, -1)$ and $C = (3, 2)$, then the minimum value of $|z| = |z - 3| + |z + i| + |z - 3 - 2i|$ occurs at the (where, z is complex number)

- A. point of intersection of AB and CO
- B. point of intersection of AC and BO
- C. point of intersection of CB and AO
- D. Mean of O, A, B, C

Answer: C



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8. If $f(x) = \begin{cases} 2x^2 + 3 & x \geq 3 \\ ax^2 + bx + 1 & x \leq 3 \end{cases}$ is differentiable everywhere, then $\frac{a}{b^2}$ is equal to

A. 5

B. $\frac{7}{3}$

C. 1

D. $\frac{16}{9}$

Answer: C



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9. The sum of the series

$$\frac{2}{1.2} + \frac{5}{2.3}2^1 + \frac{10}{3.4}2^2 + \frac{17}{4.5}2^3 + \dots \text{ upto } n$$

terms is equal :

A. $\frac{n}{n+1} \cdot 2^{n+1}$

B. $\frac{n+1}{n} \cdot 2^{n+1}$

C. $\frac{n}{n+1} \cdot 2^n$

D. $\frac{n+1}{n} \cdot 2^n$

Answer: C



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10. The number of five digit numbers formed with the digits 0, 1, 2, 3, 4 and 5 (without repetition) and divisible by 6 are

A. 72

B. 84

C. 96

D. 108

Answer: D



11. Let \vec{A} be a vector parallel to the line of intersection of the planes P_1 and P_2 . The plane P_1 is parallel to vectors $2\hat{j} + 3\hat{k}$ and $4\hat{j} - 3\hat{k}$ while plane P_2 is parallel to the vectors $\hat{j} - \hat{k}$ and $\hat{i} + \hat{j}$. The acute angle between \vec{A} and $2\hat{i} + \hat{j} - 2\hat{k}$ is

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

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

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

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

Answer: B



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12. If $y = \cos x \cos 2x \cos 4x \cos 8x$, then

$\frac{dy}{dx}$ at $x = \frac{\pi}{2}$ is

A. 1

B. 0

C. 4

D. 16

Answer: A



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13. Let points A_1, A_2 and A_3 lie on the parabola $y^2 = 8x$. If $\triangle A_1A_2A_3$ is an equilateral triangle and normals at points A_1, A_2 and A_3 on this parabola meet at the point $(h, 0)$. Then the value of h is

A. 24

B. 26

C. 38

D. 28

Answer: D



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14. Let $I = \int_0^{24\pi} \{\sin x\} dx$ then the value of $2I$ is equal to (where, $\{.\}$ denotes the fractional part function)

A. 10π

B. 24π

C. 12π

D. 4π

Answer: B



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15. The line $2x + y = 3$ cuts the ellipse $4x^2 + y^2 = 5$ at points P and Q. If θ is the

acute angle between the normals at P and Q,

then θ is equal to

A. $\tan^{-1}\left(\frac{5}{3}\right)$

B. $\sin^{-1}\left(\frac{3}{\sqrt{34}}\right)$

C. $\cos^{-1}\left(\frac{3}{\sqrt{34}}\right)$

D. $\cot^{-1}\left(\frac{3}{4}\right)$

Answer: B



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16. The shortest distance between the lines $2x + y + z - 1 = 0 = 3x + y + 2z - 2$ and $x = y = z$, is

A. $\frac{1}{\sqrt{2}}$ units

B. $\frac{1}{\sqrt{3}}$ units

C. $\frac{1}{\sqrt{4}}$ units

D. $\frac{1}{\sqrt{5}}$ units

Answer: A



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17. If
$$\begin{vmatrix} x + y & y + z & z + x \\ y + z & z + x & x + y \\ z + x & x + y & y + z \end{vmatrix} = k \begin{vmatrix} x & z & y \\ y & x & z \\ z & y & x \end{vmatrix},$$

then k is equal to

A. -2

B. 2

C. -3

D. 3

Answer: A



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18. Two circles of radii r_1 and r_2 , are both touching the coordinate axes and intersecting each other orthogonally. The value of $\frac{r_1}{r_2}$ (where $r_1 > r_2$) equals -

A. 2

B. $2 + \sqrt{3}$

C. $3 + \sqrt{2}$

D. 3

Answer: B



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19. A is a square matrix and I is an identity matrix of the same order. If $A^3 = O$, then inverse of matrix $(I - A)$ is

A. $I + A$

B. $I - A + A^2$

C. $A + A^2$

D. $I + A + A^2$

Answer: D



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20. The coefficient of x^6 in the expansion of $(1 + x + x^2)^6$ is

A. 131

B. 141

C. 151

D. 167

Answer: B



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21. Let $\int e^x \cdot x^2 dx = f(x)e^x + C$ (where, C is the constant of integration). The range of $f(x)$ as $x \in R$ is $[a, \infty)$. The value of $\frac{a}{4}$ is



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22. The sum of the roots of the equation $|\sqrt{3} \cos x - \sin x| = 2$ in $[0, 4\pi]$ is $k\pi$, then the value of $6k$ is



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23. If $f(x) + 2f(1 - x) = 6x (\forall x \in \mathbb{R})$, then the value of $\frac{3}{4} \left(\frac{f(8)}{f'(1)} \right)$ is equal to



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24. 4 different balls of green colour and 4 different balls of red colour are to be distributed equally among 4 people have balls of a different colour is λ , then the value of 7λ is equal to



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25. The number of point(s) on the curve $y^3 = 12y - 3x^2$ where a tangents is vertical is/are



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