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 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 $\frac{2}{1.2}+\frac{5}{2.3}2^1+\frac{10}{3.4}2^2+\frac{17}{4.5}2^3+....$ upto n terms is equal :

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

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

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

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

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

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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 I s

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 $\left(1+x+x^2\right)^6$ is

A. 131

B. 141

C. 151

D. 167

Answer: B

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21. Let $\int e^x . x^2 dx = f(x)e^x + C$ (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 $\left|\sqrt{3}\cos x - \sin x\right| = 2$ in $[0, 4\pi]$ is $k\pi$, then the value of 6k is

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23. If $f(x) + 2f(1-x) = 6x(\forall x \in R)$, then the vlaue 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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