MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 84

Mathematics

1. If p and q are logical statements, then $(\sim p) \rightarrow (p \rightarrow q)$ is equivalent to

A. $p \wedge q$

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

C. $p \vee q$

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

Answer: B

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2. The projection of $2\hat{i} - 3\hat{j} + 4\hat{k}$ on the line whose equation is

$\vec{r} = (3+\lambda)\hat{i} + (3-2\lambda)\hat{j} + (5+6\lambda)\hat{k},$

where λ is a scalar parameter, is

A. $\frac{6}{\sqrt{41}}$

B. $\frac{32}{\sqrt{41}}$

C. $\frac{16}{\sqrt{41}}$

D. $\frac{7}{5}$

Answer: B

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3. $f(x) = \lim_{n \to \infty} \cos^{2n}\left(\pi x^2\right) + [x]$ (where, $[.]$ denotes the greatest integer function and $n \in N$) is

A. continuous at x = 1 but discontinuous at x = 0

B. continuous at x = 1 and x = 0

C. discontinuous at x = 1 and x = 0

D. discontinuous at x = 1 but continuous at x = 0

Answer: C

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4. Two straight roads OA and OB intersect at O. A tower is situated within the angle formed by them and subtends angles of 45° and 30° at the points A and B where the roads are nearest to it. If OA = 100 meters and OB = 50 meters, then the height of the tower is

A. $25\sqrt{2}$ meters

B. 50 meters

C. $25\sqrt{6}$ meters

D. $25\sqrt{3}$ meters

Answer: C

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5. The coefficient of x^4 in the expansion of $(1+5x+9x^2+13x^3+17x^4+\ldots..)(1+x^2)^{11}$ is equal to

A. $.^{11}C_2+4.^{11}C_1+3$

B. $.^{11}C_2+3.^{11}C_1+4$

C. $3.^{11}C_2 + 4.^{11}C_1 + 3$

D. 171

Answer: D

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6. Consider $I = \int_0^1 \frac{dx}{1+x^5}$. Then, I satisfies

A. $I > 1$

B. $I = 1$

C. $I < 1$

D. $I + 1 < 0$

Answer: C

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7. If the sum to infinty of the series , $1 + 4x + 7x^2 + 10x^3 + \ldots .$, is $\frac{35}{16}$, where $|x| < 1$, then $'x'$ equals to

A. $\frac{19}{7}$

B. $\frac{1}{5}$

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

D. $\frac{4}{7}$

Answer: B

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8. 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. 4

Answer: D

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9. If a_1, a_2, a_3, a_4, a_5 are consecutive terms of an arithmetic progression with common difference 3, then the value of $\begin{vmatrix} a_3^2 & a_2 & a_1 \\ a_4^2 & a_3 & a_2 \\ a_5^2 & a_4 & a_3 \end{vmatrix}$ is

A. 0

B. 27

C. 81

D. 162

Answer: D

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10. The number of real solution of $\cot^{-1}\sqrt{x(x+4)} + \cos^{-1}\sqrt{x^2+4x+1} = \frac{\pi}{2}$ is equal to

A. 0

B. 1

C. 2

D. Infinite

Answer: C

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11. The plane containing the line $\frac{x-3}{2} = \frac{y-b}{4} = \frac{z-3}{3}$ passes through the

points $(a, 1, 2), (2, 1, 4), (2, 3, 5)$, then $3a + 5b$ is equal to

A. 4

B. 16

C. -16

D. -4

Answer: C

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12. If $A = \begin{bmatrix} 2 & 1 & -1 \\ 3 & 5 & 2 \\ 1 & 6 & 1 \end{bmatrix}$, then $tr(Aadj(adjA))$ is equal to (where, tr (P) denotes the trace of the matrix P i.e. the sum of all the diagonal elements of the matrix P and adj(P) denotes the adjoint of matrix P)

A. 7

B. 18

C. -58

D. -1624

Answer: D

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13. The area (in sq. units) covered by $[x-y]=-3$ with the coordinate axes is (where $[.]$ is the greatest integer function)

A. 2

B. 4

C. $\frac{5}{2}$

D. $\frac{11}{4}$

Answer: C

14. The number of different ways in which five alike dashes and eight alike dots can be arranged using only seen of these dashes and dots is a. 350 b. 120 c. 1287 d. none of these

A. 1287

B. 119

C. 120

D. 1235520

Answer: C

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15. The positive difference between the local maximum value and the local minimum value of the function $f(x) = x^3 - 3x - 1, \forall x \in [-2, 3]$ is

A. 20

B. 4

C. 14

D. 22

Answer: B

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16. If $B = \int \frac{1}{e^x + 1} dx = -f(x) + C$, where C is the constant of integration and $e^{f(0)} = 2$, then the value of $e^{f(-1)}$ is

A. 4

B. $e + 1$

C. $2e$

D. 0

Answer: B

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17. In the equilateral triangle ABC, the equation of the side BC is $x + y - 2 = 0$ and the centroid of ΔABC is (0, 0). If the points A, B, C

are in anticlockwise oder, then the midpoint of the line segment joining A and C is

A. $\left(\frac{-\sqrt{3}+1}{2}, \frac{\sqrt{3}+1}{2}\right)$

B. $\left(\frac{-\sqrt{3}-1}{2}, \frac{\sqrt{3}-1}{2}\right)$

C. $\left(\frac{-\sqrt{3}-1}{2}, \frac{\sqrt{3}+1}{2}\right)$

D. $\left(\frac{-\sqrt{3}+1}{2}, \frac{\sqrt{3}-1}{2}\right)$

Answer: B

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18.

$$\cos\left(\frac{\pi}{11}\right)\cos\left(\frac{2\pi}{11}\right)\cos\left(\frac{3\pi}{11}\right)\ldots.\cos\left(\frac{11\pi}{11}\right) =$$

A. $-\frac{1}{32}$

B. $\frac{1}{512}$

C. $\frac{1}{1024}$

D. $-\frac{1}{2048}$

Answer: C

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19. Let l_1 and l_2 be the two lines which are normal to $y^2 = 4x$ and tangent to $x^2 = -12y$ respectively (where, l_1 and l_2 are not the x - axis). Then, the product of the slopes of l_1 and l_2 is

A. 3

B. 2

C. 1

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

Answer: B

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20. If $i^2 = -1$, then for a complex number Z the minimum value of $|Z| + |Z-3| + |Z+i| + |Z-3-2i|$ occurs at

A. $Z = 2$

B. $Z = 2 + i$

C. $Z = 1$

D. $Z = 1 + i$

Answer: C

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21. The value fo $\lim_{x \to 0} \frac{1 - \cos^4 x}{\left(\sin^2 x \cos x\right)}$ is equal to

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22. The values of $'a'$ for which the quadraic expression $ax^2 + (a-2)x - 2$ is negative for exactly two integral values of x, belongs to

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23. A committee of 5 persons is to be randomly selected from a group of 5 men and 4 women and a chairperson will be randomly selected from the committee will have exactly 2 women and 3 men and the chairperson will be a man is p, then $\frac{1}{p}$ is equal to

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24. The order of the differential equation of the family of circles touching the y - axis at the

origin is k, then the maximum value of $y = k\cos x \forall x \in R$ is

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25. Let $x^2 + y^2 = r^2$ and $xy = 1$ intersect at $A\&B$ in first quadrant, If $AB = \sqrt{14}$ then find the value of r.

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