MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 54

Mathematics

1. If $z = x + iy$ and $w = \frac{(i - iz)}{(z - i)}$ then $|w| = 1$, show that in complex plane

A. z is situated on imaginary axis

B. z is situated on real axis

C. z is situated on unit circle

D. None of these

Answer: B

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2. let A be a matrix of order 3×3 and matrices B,C and D are related such that $B = adj(A)C = adj(adj), D$ if

$= (adj(adj(adjA)))$

$|adj(adj(adj(adjABCD)))|$ is $|A|^k$, then k

A. is less than 256

B. has 21 divisors

C. cannot say

D. is an odd number

Answer: A

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3. If $L: ax + by + c = 0$ is a variable straight line where a,b and c are second, fourth and seventh term of an A.P respectively, then L passes thorugh the fixed point

A. $\left(-\frac{3}{2}, \frac{5}{2}\right)$

B. $\left(\frac{3}{2}, -\frac{5}{2}\right)$

C. $\left(\frac{3}{2}, \frac{5}{2}\right)$

D. $\left(-\frac{3}{2}, -\frac{5}{2}\right)$

Answer: B

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4. Which of the following functinons is NOT one -one?

A. $f: R \to F, f(x) = 6x - 1$

B. $f: R \to R, f(x) = x^2 + 7$

C. $f: R \to R, f(x) = x^3$

D. $f: R - \{7\} \to R, f(x) = \dfrac{2x + 1}{x - 7}$

Answer: B

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5. Tangents drawn from the point (4,4) to the circle

$x^2 + y^2 - 2x - 2y - 7 = 0$ meets the circle at A andB then the length of chord AB is equal to

A. $2\sqrt{3}$

B. $3\sqrt{2}$

C. $4\sqrt{3}$

D. $2\sqrt{6}$

Answer: B

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6. Let $p(3\sec\alpha, 2\tan\alpha)$ and $Q(3\sec\beta, 2\tan\beta)$ be two points on hyperbola $H_1 : \frac{x^2}{9} - \frac{y^2}{4} = 1$ such that $\alpha - \beta = \frac{2\pi}{3}$. If PQ is tangent to hyperbola $H_2 : \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, the ecentricity of hyperbola H_2 is

A. $\frac{\sqrt{10}}{3}$

B. $\frac{2}{\sqrt{3}}$

C. $\frac{\sqrt{13}}{3}$

D. $\frac{\sqrt{5}}{\sqrt{3}}$

Answer: A

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7. Three numbers are chosen at random from 1 to 15. The probability that no two numbers are consecutive is

A. $\frac{11}{32}$

B. $\frac{44}{91}$

C. $\frac{33}{64}$

D. $\frac{22}{35}$

Answer: D

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8. If point (0,a) lies inside the triangle formed by the lines $y + 3x + 2 = 0, 3y - 2x - 5 = 0$

and$4y + x - 14 = 0$, then the number of possible integral values of a is

A. 4

B. 3

C. 2

D. 1

Answer: C

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9. If the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1, b > 0$ and the hyperbola $\frac{x^2}{81} - \frac{y^2}{63} = \frac{1}{16}$ intersect orthogonally, then the value of b^2 is

A. 5

B. 7

C. 9

D. $\frac{81}{7}$

Answer: B

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10. If $\vec{A} = \hat{i} + \hat{j} + \hat{k}, \vec{B} = 4\hat{i} + 3\hat{j} + 4\hat{k}$ and $\vec{C} = \hat{i} + \alpha\hat{j} + \beta\hat{k}$ are linearly dependent vector and $\left|\vec{C}\right| = \sqrt{3}$, then

A. $\alpha = 1, \beta = -1$

B. $\alpha = 1, \beta = \pm 1$

C. $\alpha = -1, \beta = \pm 1$

D. $\alpha = \pm 1, \beta = 1$

Answer: D

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11. If $y = \log\{\log_2(x)\}$, then $\frac{dy}{dx}$ is

A. $\frac{\log_2 e}{xInx}$

B. $\frac{2.3026}{xInx2}$

C. $\frac{1}{In(2x)^x}$

D. None of these

Answer: A

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12. The value of $\lim_{x \to 0} \frac{1 - \cos^3 x}{\sin x \cos x}$ is

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

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

C. $\frac{3}{2}$

D. $\frac{3}{4}$

Answer: C

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13. If $P = \int_1^2 \left(\frac{\sqrt{x^2+1}+x-1}{\sqrt{x^2+1}+x+1} \right) dx$ and $Q = \int_1^2 \left(\frac{x}{\sqrt{x^2+1+1}} \right) dx$ then $\frac{P}{Q}$ is equal

A. $In\frac{2}{5}$

B. $\frac{2}{3}$

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

D. 1

Answer: D

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14. If $y = f(x)$ is passing through (1,2) satisfied the differential equation $y(1 + xy)dx - xdy = 0$, then f(2) equals

A. -2

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

C. $\frac{-8}{7}$

D. not defined

Answer: A

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15. The value of the integral $\int \frac{\sec x}{\sin x + \cos x} dx$

A. $In|1 + \tan x| + C$

B. $In|\tan x| + C$

C. $\tan^{-1}(1 + \tan x) + C$

D. $In|\sin x + \cos x|.\sec x + C$

Answer: A

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16. One of the sides of a triangle is divided into segments of 4 and 6 units by the point of tangency of the inscribed circle which has radius $2\sqrt{2}$ units, then the largest side of triangle is

A. 10

B. $\frac{21}{2}$

C. $\frac{43}{4}$

D. 11

Answer: D

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17. The number of positive integral values of a for which there is no solution of the equation $a\cos x + \cot x + 1 = \cos ecx$, where $x \neq \frac{n\pi}{2}, n \in Z$ is

A. 1

B. 2

C. 3

D. 4

Answer: D

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18. The complete solution set for $\sin^{-1}(x) = 3\sin^{-1}(a)$ is

A. $0 \leq a \leq \frac{1}{2}$

B. $-\frac{1}{2} \leq a \leq 0$

C. $-\frac{1}{2} \leq a \leq \frac{1}{2}$

D. None of these

Answer: C

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19. Which one of the following is a tautology?

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

B. $p \vee (q \wedge r)$

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

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

Answer: D

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20. In the expansion of $\frac{1}{(1-x+x^2)^{30}}$, find the coefficien of x^6 where $|x| < 1$.

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21. If $M = \begin{pmatrix} 1 & 2 \\ 2 & 3 \end{pmatrix}$ and $M^2 - \lambda M - I_2 = O$ then 2^λ must be

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22. The number of five digit numbers that can be formed using all the digits 0,1,3,6,8, greater than 30,000 that are divisible by 11 is λ then find $\frac{\lambda^2}{7}$

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23. If the roots of the quadratic equation $\left(4p - p^2 - 5\right)x^2 - (2p - 1)x + 3p = 0$ lie on either side of unity, then the number of integral values of p is

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24. If the line $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z-1}{4}$ and $\frac{x-2}{1}=\frac{y-k}{2}=\frac{z}{1}$ are coplanar, then k is equal to

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25. Let

$$f(x)=\begin{cases}\frac{1+\cos x}{(\pi-x)^2}\cdot\frac{\sin^2 x}{\log(1+\pi^2-2\pi x+x^2)} & x\neq\pi\\ k & x=\pi\end{cases}$$

f(x) is continuous function at $x = \pi$ then k is equal to

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26. The point nearest to the line $x + y = 7$ and lying onan ellipse $x^2 + 2y^2 = 6$, has co ordinate (h,k) The value of $\frac{k}{h}$ is

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27. Let $f(x) = \min\left(x+1, \sqrt{1-x}\right)$ for all $x \leq 1$. Then thrice of area (in square unit) bounded by $y = f(x)$ and the x-axis is

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28. The number of positive real roots of equation

$(x-1)(x-2)(x-3)$

$+(x-1)(x-2)(x-4)$

$+(x-2)(x-3)(x-4)$

$+(x-1)(x-3)(x-4)=0$ is

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29. Let $a_1, a_2, a_3, \ldots\ldots\ldots a_{10}$ be in AP and $h_1, h_2, h_3, \ldots\ldots\ldots h_{10}$ be in HP. If $a_1 = h_1 = 2, a_{10} = h_{10} = 3$, the value of $a_4 h_7$

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