MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 101

Mathematics

1. Find the coefficient of x^5 in the expansion of $\left(1+2x+3x^2+\cdots\right)^{-\frac{3}{2}}$?

A. 21

B. 25

C. 26

D. None of these

Answer: D

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2. If a tangent of slope 'm' at a point of m the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ passes through a b (2a,

0) and if 'e' denotes the eccentricity of the ellipse, then

A. $m^2 + 2e^2 = 1$

B. $3m^2 + e^2 = 1$

C. $2m^2 + e^2 = 1$

D. $m^2 + e^2 =$

Answer: B

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3. The proposition $\sim(p \vee q) \wedge (p \vee q)$

A. $(\sim p \wedge \sim q) \vee (p \vee q)$

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

C. $(\sim p \wedge \sim q) \wedge (p \wedge q)$

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

Answer: A

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4. If $S_r = \begin{vmatrix} 2r & x & n(n+1) \\ 6r^2-1 & y & n^2(2n+3) \\ 4r^3-2nr & z & n^{30}(n+1) \end{vmatrix}$ then value of $\sum_{r=1}^{n} S_r$ is independent of -

A. x only

B. y only

C. x, y, z, n

D. n only

Answer: C

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5. If domain of f(x) is [1, 3], then find the domain off $f\left(\log_2\left(x^2+3x-2\right)\right)$

A. $[-5,\ -4]\cup[1,2]$

B. $[-13,\ -2]\cup\left[\frac{3}{2},5\right]$

C. $[-4,1]\cup[2,7]$

D. $[3,2]$

Answer: A

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6. If A and B are two given sets, then $A \cap (A \cap B)^c$ is equal to

A. A

B. B

C. ϕ

D. $A \cap B^c$

Answer: D

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7. Positive integers $a_1, a_2, a_3, \ldots\ldots\ldots\ldots\ldots$ form an arithmetic progression (A. P.). If a_1 = 5 and a_4 = 25, then a_6 is equal to

A. $2a_1$

B. $3a_1$

C. $a_1 + a_2$

D. $a_1 + a_3$

Answer: B

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8. A die is thrown three times and the sum of the three numbers thrown is 15, then the probability that the first throw was a four is

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

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

C. $\frac{1}{6}$

D. $\frac{2}{15}$

Answer: A

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9. A plane makes intercepts OA, OB, OC whose measures are a, b, c on the axes x, y, z respectively. The area of the triangle ABC is

A. $\frac{1}{2}\sqrt{a^2+b^2+c^2}$

B. $\frac{1}{2}\sqrt{b^2c^2+c^2a^2+a^2b^2}$

C. $\frac{1}{2}\sqrt{ab+bc+ac}$

D. $\frac{1}{1}\sqrt{a^2b+b^2c+c^2a}$

Answer: B

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10. The exhaustive intervals of real values of x such that

$\sqrt{12-4x} > 1+\sqrt{4x+4}$ is

A. $\left[1-\frac{\sqrt{31}}{8}, 1+\frac{\sqrt{31}}{8}\right)$

B. $\left[-1, 1+\frac{\sqrt{31}}{8}\right)$

C. $[-1, 3]$

D. $\left[-1, 1-\frac{\sqrt{31}}{8}\right)$

Answer: D

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11. If $1, \omega, \omega^2 \ldots\ldots\ldots\ldots\ldots\ldots \Omega^{n-1}$ are the n roots of unity then

$(1-\omega)(1-\omega^2)\ldots\ldots\ldots\ldots\ldots (1-\omega^{n-1})$

equals

A. 0

B. 2

C. n

D. n^2

Answer: C

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12. $\lim_{n \to \infty} II_{n=2}^{n} \left(1 - \frac{3}{n(n+2)}\right)$ is equal to

A. 1

B. 4

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

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

Answer: C

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13. If f (x) = $\begin{cases} \frac{2}{1+x^2} & x \notin Q \\ b & x \in Q \end{cases}$ has exactly two points of continuity, then the values of b are

A. (0, 1)

B. (0, 2)

C. (2, 4)

D. 0

Answer: B

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14. Let f (x) be a function satisfying f' (x) = f (x) with f(O) = 1 and g(l) and g (x) be a function that satisfies f (x) + g(x) = x^2 . Evaluate: f_0^1 f (x) g(x)dx

A. $e + \frac{e^2}{2} - \frac{3}{2}$

B. $e - \frac{e^2}{2} - \frac{3}{2}$

C. $e + \frac{e^2}{2} + \frac{5}{2}$

D. $e - \frac{e^2}{2} - \frac{5}{2}$

Answer: B

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15. If the pair of tangents are drawn from 0 (0, 0) to the circle $x^2 + y^2 - 6x - 8y = -21$ meets the circle in A and B, then length of BA is

A. 11

B. $\frac{4}{5}\sqrt{21}$

C. $\sqrt{\frac{17}{3}}$

D. $\frac{\sqrt{21}}{5}$

Answer: B

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16. Area of the region bounded by the curve y = tan x, tangent drawn to the curve at x = $\frac{\pi}{4}$ and the x-axis is

A. log $\sqrt{2}$

B. log $\sqrt{2} + \frac{1}{4}$

C. log $\sqrt{2} - \frac{1}{4}$

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

Answer: C

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17. The mean and median of a moderately skewed distribution are 5 and 6 respectively. Then the value of mode in such a situation is approximately equal to

A. 8

B. 11

C. 16

D. None of these

Answer: A

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18. A ray travelling along the line $3x - 4y = 5$ after being reflected from a line l travels along the line $5x + 12y = 13$. Then, the equation of the line l is

A. $x+8y= 0$

B. $x=8y$

C. $X + 4y = 65$

D. 32x - 4y = -65

Answer: B

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19. The roots of the equation $x^5 - 40x^4 + px^3 + qx^2 + rx + s = 0$ are in geometric progression and the sum of their reciprocals is 10. Then |s| is equals to

A. 64

B. 16

C. 32

D. None of these

Answer: C

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20. For each n $\in$ N, the correct statement is

A. $2^n < n$

B. $n^2 > 2n$

C. $n^4 < 10^n$

D. $2^{3n} > 7n + 1$

Answer: C

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21. If f (x) = $x^3 + e^{\frac{x}{2}}$ and g (x) is the inverse of f (x), then find g'(l)

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22. A polygon has 44 diagonals. Find the number of sides.

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23. If a, b, care positive real numbers and the system of equations (a - 1) x = y + z, (b - 1) y = z + x and (c - 1)z = x + y has a non trivial solution, then find the minimum value of $\frac{abc}{10}$.

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24. If x = 9 is the chord of contact of the hyperbola $x^2 - y^2 = 9$, then the equation of the pair of tangents forming the chord of contact is $ax^2 - by^2 - 18x + 9 = 0$. Find the value of a+ b.

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25. Let $\vec{p}, \vec{q}, \vec{r}$ be three mutually perpendicular unit vectors. If a vector $\vec{x}$ satisfies the equation

$\vec{p} \times \left(\left(\vec{x} - \vec{q} \right) \times \vec{p} \right) +$

$\vec{q} \times \left(\left(\vec{x} - \vec{r} \right) \times \vec{q} \right) +$

$\vec{r} \times \left(\left(\vec{x} - \vec{p} \right) \times \vec{r} \right) = \vec{0}$ then

$\vec{x} . \vec{x}$ is

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26. If cos x = tan y, cos y= tan z, cos z then = tan

x sin x = a sin x = a sin b° , find ab

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27. Consider the inequation cos x - cos 3x $\geq 0x \in [0, 2\pi]$. If the solution set is $[0, a\pi] \cup [b\pi, 2\pi]$, then find b - a

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28. If $\tan^{-1}\left(\frac{2}{11}\right) + \tan^{-1}\left(\frac{1}{2}\right) = \frac{1}{m}$ where $\cos^{-1}\left(\frac{p}{q}\right)$

G.C.D (p, q) = 1, then find q - mp.

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29. $m \in R$. The substitution $y = um$ transforms the differential equation $2x^4y\frac{dy}{dx} + y^4 = 4x^6$ into a homogeneous equation. Find the value of 2m.

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