MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 108

Mathematics Single Choice

1. If $0 < |x| < 1$, the coefficient of x^n in the expansion of $(1-x)^{-1}$ is .....

A. -1

B. 0

C. 2

D. 1

Answer: D

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2. If x + y == k is normal to $y^2 = 12x$ then k is

A. 3

B. 9

C. -9

D. -3

Answer: B

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3. The contra positive of the following statement "If the side of a square doubles, then its area increases four times" is

A. If the side of a square is not doubled, then its area does not increase four times

B. If the area of a square does not increase four times, then its side is not doubled.

C. If the area of a square increases four times, then its side is not doubled

D. If the area of a square increase four times, then its side is doubled.

Answer: B

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4. If $\sum_{n=1}^{n}\alpha_n = an^2 + bn$, where a, b are constants and $\alpha_1, \alpha_2, \alpha_3 \in \{1, 2, 3, \ldots\ldots, 9\}$ and $25\alpha_1, 37\alpha_2, 49\alpha_3$ be three digit numbers, then $\begin{vmatrix} \alpha_1 & \alpha_2 & \alpha_3 \\ 5 & 7 & 9 \\ 25\alpha_1 & 37\alpha_2 & 49\alpha_3 \end{vmatrix} =$

A. $\alpha_1 + \alpha_2 + \alpha_3$

B. $\alpha_1 - \alpha_2 + \alpha_3$

C. 7

D. 0

Answer: D

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5. The number of integral values of x satisfying the equation sgn $\left(\left[\frac{13}{2+x^2}\right]\right) = [1+\{2x\}]$ is

[Note: [k] and $\{k\}$ denotes greatest integer function less than or equal to k and fraction part function of k respectively.]

A. 6

B. 7

C. 8

D. infinite

Answer: B

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6. If P, Q and Rare subsets of a set A, then $R \times (P^c \cup Q^c)^c =$

A. $(R \times P) \cap (R \times Q)$

B. $(R \cap Q) \cap (R \times P)$

C. $(R \times P) \cup (R \times Q)$

D. None of these

Answer: A

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7. The difference of the focal distance of any point on the hyperbola is equal to its

A. Latus rectum

B. Eccentricity

C. Length of the transverse axis

D. Half the length of the transverse axis

Answer: C

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8. The largest term common to the sequences 1, 11, 21, 31,..... to 100 terms and 31, 36, 41, 46, ... to 100 terms, is

A. 91

B. 281

C. 381

D. 521

Answer: D

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9. Let $f(x) = 2x + \cot^{-1} x$. Then $f(x) + \ln\left(\sqrt{1+x^2} - x\right)$

A. increases in $(-\infty, \infty)$

B. decreases in $(-\infty, \infty)$

C. neither increases nor decreases in $(0, \infty)$

D. increases as well as decreases in $(-\infty, \infty)$

Answer: A

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10. Let $\vec{r}$ be a unit vector satisfying $\vec{r} \times \vec{a} = \vec{b}$ where $\left|\vec{a}\right| = \sqrt{3}$ and $\left|\vec{b}\right| = \sqrt{2}$, then

A. $\vec{r} = \frac{2}{3}\left(\vec{a} + \vec{a} \times \vec{b}\right)$

B. $\vec{r} = \frac{1}{3}\left(\pm\vec{a} + \vec{a} \times \vec{b}\right)$

C. $\vec{r} = \frac{1}{4}\left(\pm\vec{a} + \vec{a} \times \vec{b}\right)$

D. $\vec{r} = \frac{2}{3}\left(\pm\vec{a} + \vec{a} \times \vec{b}\right)$

Answer: B

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11. $\lim_{n \to \infty}$ is

$\left[\log_{n-1}(n)\log_n(n+1).\log_{n+1}(n+2).....\log_{n^k-1}\left(n^k\right)\right]$ equal to

A. ∞

B. n

C. k

D. None of these

Answer: C

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12. Let $f(x) = \begin{cases} x^2+3x+\lambda & x \leq 1 \\ \mu x+2 & x>1 \end{cases}$ is a differentiable function $\forall x \in R$, then

A. $\lambda = 3$

B. $\lambda = -3$

C. $\mu = -5$

D. $\mu = 4$

Answer: A

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13. Let $f: R \to R$ such that $f(x+2y) = f(x) + f(2y) + 4xy, x, y \in R$ and $f'(0) = 0$

If $I_1 = \int_0^1 f(x)dx, I_2 = \int_{-1}^0 f(x)dx, I_3 = \int_{\sqrt{1/2}}^2 f(x)dx$, then

A. $I_1 = I_2 > I_3$

B. $I_1 > I_2 > I_3$

C. $I_1 = I_2 < I_3$

D. $I_1 < I_2 < I_3$

Answer: C

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14. Statement-1: The circle $x^2 + y^2 - 8x - 4y + 16 = 0$ touches axis of x at the point (4 , 0).

Statement-2: The circle $(x - a)^2 + (y - r)^2 = r^2$ touches axis of x at the point (a, 0). Then which of the following is correct?

A. Statement-1 Is True, Statement-2 Is True Statement-2 Is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: A

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15. If $0 < \beta < \alpha < \frac{\pi}{2}$ such that $\cos(\alpha + \beta) = \frac{3}{5}$ and $\sin(\alpha - \beta) = \frac{3}{5}$ then $\sin 2\alpha$ is equal to

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

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

C. $\frac{4}{5}$

D. 1

Answer: D

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16. The most general solution of $\tan\theta = -1$ and $\cos\theta = \frac{1}{\sqrt{2}}$ is (Where n $\in I$)

A. $n\pi + \frac{7\pi}{4}$

B. $n\pi + \frac{5\pi}{4}$

C. $2n\pi + \frac{7\pi}{4}$

D. $2n\pi + \frac{5\pi}{4}$

Answer: C

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17. If $x > 0, y > 0, z > 0, xy + yz + zx < 1$ and if $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \pi$, then x+y+z equals to

A. 0

B. xyz

C. 3xyz

D. $\sqrt{xyz}$

Answer: B

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18. The mean of the values 0, 1, 2, ... , n with the weights ${}^nC_0, {}^nC_1, {}^nC_2, \ldots\ldots\ldots, {}^nC_n$, respectively, is .....

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

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

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

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

Answer: D

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19. What is the correct solution of differential equation:

$x^2(xdy+ydx)=(xy-1)^2dx$ (where c is an arbitrary constant)

A. xy-1=cx

B. $xy-1=cx^2$

C. $\frac{1}{xy-1}=\frac{1}{x}+c$

D. None of these

Answer: C

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20. For every natural number n (n + 1) is always

A. Even

B. Odd

C. Multiple of 3

D. Multiple of 4

Answer: A

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Mathematics Subjective Numerical

1. The sides AB, BC, CA of a triangle ABC have 3, 4 and 5 interior points respectively on them. The total number of triangles that can be formed from these points as vertices is p, find the digital sum of p

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2. If $[x]$ denotes the greatest integer function less than or equal to a and

$$\Delta = \begin{vmatrix} [e] & [\pi] & [\pi^2 - 6] \\ [\pi] & [\pi^2 - 6] & [e] \\ [\pi^2 - 6] & [e] & [\pi] \end{vmatrix}$$

Evaluate Δ

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3. If the lines $\frac{x-2}{1} = \frac{y-3}{1} = \frac{z-4}{-k}$ and $\frac{x-1}{k} = \frac{y-4}{2} = \frac{z-5}{1}$ are coplanar,then find the number of values of k.

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4. If the $\arg\left(\frac{z_1-\frac{z}{|z|}}{\frac{z}{|z|}}\right)=\frac{\pi}{2}, \left|\frac{z}{|z|}-z_1\right|=3$ and $\left(\frac{z_1-\frac{z}{|z|}}{\frac{z}{|z|}}\right)=\frac{\pi}{2}, \left|\frac{z}{|z|}-z_1\right|=3$, then find the value of k

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5. If $\int(4x+1)\sqrt{x^2-x-2}dx$

$=\frac{4}{3}f(x^2-x-2)+\frac{p}{q}(2x-1)g(x^2-x-2)-\left(\frac{m}{n}\right)h\left(\left|x-\frac{1}{2}+\sqrt{x}\right.\right.$

then the value of

$\left[\frac{m}{n}\right]+f(4)+pq+g(4)+h(1)$ (where = ...

$[.]$ presents the greatest integer function, and G.C.D. (P, g) = 1, G.C.D. (m, n) = 1)

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6. The area of the region in Ist quadrant bounded by y-axis, $y=\frac{x}{4}, y=1+\sqrt{x}$ and $y=\frac{2}{\sqrt{x}}$ is equals to .....

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7. Find the distance of the line 2r-3y = 4 from the point (1,1) measured parallel to the line $x + y = 1$. $\left(\sqrt{2} = 1.41\right)$

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8. f (x) be a polynomial of degree at most 7 which leaves remainders -1 and 1 upon division by $(x-1)^4$ and $(x+1)^4$ respectively. If the sum of pairwise product of all roots of f(z) =0 is n then the value of (5n + 24) is

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