MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 109

Mathematics

1. Find the sum of first 12 terms in the series:

$${}^{12}C_1\frac{.1}{3}+{}^{12}C_2\frac{.1}{9}+{}^{12}C_3\frac{.1}{27}+\ldots\ldots$$

A. $\left(\frac{4}{3}\right)^{12}+1$

B. $\left(\frac{3}{4}\right)^{12}-1$

C. $\left(\frac{3}{4}\right)^{12}+1$

D. $\left(\frac{4}{3}\right)^{12}-1$

Answer: D

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2. The ends of the latus rectum of the conic

$x^2 + 10x - 16y + 25 = 0$

A. $(3, -4), (13, 4)$

B. $(-3, -4), (13, -4)$

C. $(3, 4), (-13, 4)$

D. $(5, -8), (-5, 8)$

Answer: C

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3. Which of the following is the negation of the statement $p \vee (\sim p \vee q)$?

A. $p \wedge q$

B. tautology

C. fallacy

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

Answer: C

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4. If $a \neq p, b \neq q, c \neq r$ and $\begin{vmatrix} p & b & c \\ a & q & c \\ a & b & r \end{vmatrix} = 0,$ then $\frac{p}{p-a} + \frac{q}{q-b} + \frac{r}{r-c}$ is equal to-

A. 0

B. 1

C. -1

D. 2

Answer: D

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5. Domain and range of the function

$f(x) = \sqrt{\sin^{-1}(3x) + \frac{\pi}{3}}$ is $\left[\frac{a}{\sqrt{3}}, \frac{b}{3}\right]$ and $\left[c, d\sqrt{5\pi}\right]$ respectively, then 2a + b + c + 6d is equal to-

A. 1

B. $2\sqrt{3}$

C. $\sqrt{6}$

D. none of these

Answer: C

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6. In rule method the null set is represented by

A. $\{\}$

B. ϕ

C. $\{x : x = x\}$

D. $\{x : x \neq x\}$

Answer: D

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7. Find the eccentricity for the hyperbola

$9x^2 - 16y^2 = 144$

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

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

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

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

Answer: A

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8. If $\sum_{n=1}^{360}\left(\frac{1}{n\sqrt{n+1}+(n+1)\sqrt{n}}\right)=\frac{p}{q}$ (where p and q relatively prime integer) then |p-q| is equal to-

A. 0

B. 1

C. 2

D. 3

Answer: B

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9. The equation of the curve such that the subtangent at any point of the curve is two times the abscissa of the point and curve passes through point (1,2) is:

A. $y^2 = x + 3$

B. $y = x^2$

C. $y^2 = 4x$

D. $y = 2x^2$

Answer: C

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10. If A, B, C and D are four points in space having $\left|\overrightarrow{AB} \times \overrightarrow{CD} + \overrightarrow{BC} \times \overrightarrow{AD} + \overrightarrow{CA} \times \overrightarrow{BD}\right|$, then the value = k (Area of $\triangle ABC$) of k is equal to

A. 4

B. 3

C. 2

D. 5

Answer: A

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11. $\lim_{x \to 0}\left(\frac{a^x + b^x + c^x}{3}\right)^{\frac{2}{1+\sin x - \cos x}}$ is equal to (where $a > 0, b > 0, c > 0$)

A. (abc)

B. $(abc)^{\frac{3}{2}}$

C. $(abc)^{\frac{2}{3}}$

D. none of these

Answer: C

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12. Consider function:

$$f(x) = \begin{cases} \frac{\tan\{2x-3\}}{x-2} & x \in (2, \infty) \\ [x^2] + \text{sgn}(x) & x \in (-\infty, 2] \end{cases}$$, then that x = 2

[Note: {k} & [k] denote fractional part & greatest integer function less than or equal to k respectively and sgn denotes signum part of function.]

A. f(x) is continuous

B. f(x) is discontinuous

C. f(x) is differentiate, but f'(x) is discontinuous

D. None of these

Answer: B

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13.

$$\text{llim}(n \to \infty)\left\{\frac{1}{(n+1)(n+2)} + \frac{1}{(n+2)(n+4)} + \ldots\ldots + \frac{1}{6n^2}\right\} =$$

A. log (3/2)

B. log (2/3)

C. $\frac{1}{3}\log 2$

D. $\frac{1}{2}\log 3$

Answer: A

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14. Let $\phi(x, y) = 0$ be the equation of a circle if $\phi(0, \lambda) = 0$ has equal roots. $\lambda = 2, 2$ and $\phi(\lambda, 0)$ has roots $\lambda = \frac{4}{5}, 5$, then, find the centre of the circle.

A. $\left(2, \frac{29}{10}\right)$

B. $\left(\frac{29}{10}, 2\right)$

C. $\left(-2, \frac{29}{10}\right)$

D. None of these

Answer: B

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15. If $\sec\theta - \tan\theta = 3$, then the value of sin 30 is equal to-

A. $-\frac{108}{125}$

B. $\frac{108}{125}$

C. $\frac{44}{125}$

D. $-\frac{44}{125}$

Answer: D

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16. If f (x, y) satisfies the equation $1 + 4x - x^2 = \sqrt{9\text{sec}^2 y + 4\ \ \text{cosec}^2 y}$, then the value of $x + 3\tan^2 y$ is equal to-

A. 4

B. 2

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

D. 1

Answer: A

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17. If $\sin^{-1}\left(x - \frac{x^2}{2} + \frac{x^3}{4} - \ldots\ldots\infty\right) + \cos^{-1}\left(x^2 - \frac{x^4}{2} + \frac{x^6}{4} - \ldots\ldots\ldots\right.$ and $0 < x < \sqrt{2}$, then x =

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

B. 1

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

D. -1

Answer: B

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18. When the values of mean, median and mode coinicides then the distribution is known as

A. symmetric distribution

B. negatively skewed distribution

C. moderately skewed distribution

D. positively skewed distribution

Answer: A

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19. Which of the following is the general solution of the equation $\frac{dy}{dx} = \frac{x(2\log x + 1)}{\sin y + y\cos y}$ = ?

A. $y\sin y = x^2\log x + \frac{x^2}{2} + c$

B. $y\cos y = x^2(\log x + 1) + c$

C. $y\cos y = x^2\log x + \frac{x^2}{2} + c$

D. $y\sin y = x^2\log x + c$

Answer: D

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20. If x and y are digits such that 17! = 3556xy428096000, then x + y equals:

A. 15

B. 6

C. 12

D. 13

Answer: A

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21. A grandfather with 8 grandchildren, takes 3 at a time to a park as often as he can, without taking the same 3 grandchildren together more than once. Let p and q represent the number of times the grandfather goes to the park and each child goes to the park respectively. Evaluate p + q

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22. Let X denotes the number of times heads occur in n tosses of a fair coin. If P(X = 4), P(X = 5) and P(X = 6) are in A. P., then find the sum of possible values of n.

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23. ABC is a triangle in a plane with vertices A(1,a,0), B(0,1,-1) and C(2,1,0). If the median through A is equally inclined to the co-ordinate axes, then find the value of $\alpha^3 + 8\beta^3 + 4$

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24. If the area of bounded by the curve $y = x^2 + 1$ and the tangents to it drawn from the origin is A, then the value of $\frac{27}{8}$ A is:

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25. If A is the area and 2s is the sum of the sides of a triangle, and $s^2 = A\sqrt{m}$, then m is equal to:

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26. Let $S = \{a \mid a \in N, a \leq 100\}$. Number of $a \in S$ for which equation $\left[\tan^2 x\right] - \tan x - a = 0$ has real roots (where [.] GIF)

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