MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 79

Mathematics

1. If $2x = y^{\frac{1}{3}} + y^{\frac{-1}{3}}$, then the value of $\frac{x^2-1}{y} \cdot \frac{d^2y}{dx^2} + \frac{x}{y} \cdot \frac{dy}{dx}$ is

A. 9

B. 3

C. 18

D. None of these

Answer: A

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2. If the normal to the ellipes $3x^2 + 4y^2 = 12$ at a point P on it is parallel to the line, $2x + y = 4$ and tangent to the ellipse at P passes through Q(4,4) then PQ is equal to

A. $\frac{\sqrt{221}}{2}$

B. $\frac{\sqrt{157}}{2}$

C. $\frac{\sqrt{61}}{2}$

D. $\frac{5\sqrt{5}}{2}$

Answer: D

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3. Which of the following is not a proposition ?

A. Please do me a favour

B. 2 is an even integer

C. $2+1=3$

D. The number 17 is prime

Answer: A

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4. If

$$D_k = \begin{vmatrix} 1 & n & n \\ 2k & n^2+n+1 & n^2+n \\ 2k-1 & n^2 & n^2+n+1 \end{vmatrix} \text{ and } \sum_{k=1}^{n} D_k = 56,$$

then equals to

A. 4

B. 8

C. 6

D. None of these

Answer: D

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5. Let M be a 3×3 Non-singular matrix with $|M| = \alpha. If M^{-1} adj(adjM) = KI,$ then the value of K is

A. 1

B. α

C. α^2

D. α^3

Answer: D

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6. The P be the family of parabolas $y = x^2 + px + q(q \neq 0)$ whose graphs cut the axes in three points. The circle passing through these three points will always pass through

A. $(1, 0)$

B. $(0, 1)$

C. $(1, 1)$

D. None of these

Answer: B

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7. If the cocil of the ellipse $\frac{x^2}{k^2a^2}+\frac{y^2}{a^2}=1(k>1)$ and hyperbola $\frac{x^2}{a^2}$ coincides $-\frac{y^2}{a^2}=1$ then k = ?

A. $\pm\sqrt{3}$

B. $\pm\sqrt{2}$

C. $\sqrt{3}$

D. $\sqrt{2}$

Answer: C

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8. The probability that a man can hit a target is $\frac{3}{4}$, he tries 5 times. The probability that he will hit the target at least three times is

A. $\frac{291}{364}$

B. $\frac{371}{464}$

C. $\frac{471}{502}$

D. $\frac{459}{512}$

Answer: D

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9. The point on the curve $9y^2 = x^3$ where normal to the curve makes equal intercept with the coordinate axes is

A. $\left(4, \frac{8}{3}\right)$

B. $\left(8, \frac{64}{3}\right)$

C. $\left(8, -\frac{64}{3}\right)$

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

Answer: A

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10. Let two non-collinear vectors $\vec{a}$ and $\vec{b}$ inclined at an anlge $\frac{2\pi}{3}$ be such that $\left|\vec{a}\right| = 3$ and $\left|\vec{b}\right| = 2$.

If a point P moves so that at any time t its positive vector $\overrightarrow{OP}$ (where O is the origin) is given as $\overrightarrow{OP} = \left(t + \frac{1}{t}\right)\vec{a} + \left(t - \frac{1}{t}\right)\vec{b}$, then least distance of P from the origin is

A. $\sqrt{2\sqrt{133} - 10}$

B. $\sqrt{2\sqrt{133} + 10}$

C. $\sqrt{5 + \sqrt{133}}$

D. none of these

Answer: B

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11. The value of $\lim_{x \to \infty} \frac{1}{x^2} \int_0^x \ln\left(1 + e^{2t}\right) dt$ equals

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

B. 1

C. 2

D. 4

Answer: B

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12. If [x] denotes the integeral part of x and in $(0, \pi)$,

we define

$$f(x)\begin{cases}\left[\dfrac{2\left(\sin x-\sin^{n}\right)+|\sin x-\sin^{n} x|}{2\left(\sin x-\sin^{n} x\right)-|\sin x-\sin^{n} x|}\right] & x \neq \dfrac{\pi}{2} \\ 3 & x=\dfrac{\pi}{2}\end{cases}$$ Then

for $n > 1$

A. f (x) is continuous but not differentiable at $x = \dfrac{\pi}{2}$

B. both continuous and differentiable at $x = \dfrac{\pi}{2}$

C. neither continuous nor differentiable at $x = \dfrac{\pi}{2}$

D. $\lim\limits_{x \to \frac{\pi}{2}} f(x)$ exists but $\lim\limits_{x \to \frac{\pi}{2}} f(x) \neq f\left(\dfrac{\pi}{2}\right)$

Answer: B

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13. $\int x^{2/3}\left(1+x^{1/2}\right)^{\frac{-13}{3}}dx$

A. $\frac{3}{5}\left(1+x^{-1/2}\right)^{-10/3}+C$

B. $\frac{3}{5}\left(1+x^{1/2}\right)^{-\frac{10}{3}}+C$

C. $\frac{\left(1+x^{1/2}\right)}{13}+C$

D. None of the above

Answer: A

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14. Which of the following option represents positive quantity ?

A. $\log_{\tan 1} \sin 1$

B. $\cos 1 - \sin 1$

C. $\sin 2 + \cos 2 - \cos 3$

D. $\log_5 45 - \log_3 35$

Answer: C

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15. Find the area bounded by the curve $\frac{y}{\sqrt{1-x^2}} = x^2$

A. $\frac{\pi}{6}$ sq. units

B. $\frac{\pi}{4}$ sq. units

C. $\frac{\pi}{3}$ sq. units

D. $\frac{\pi}{2}$ sq. units

Answer: B

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16. If $\cos^2\theta_1 + \cos^2\theta_2 + \cos^2\theta_3 = 0,$ then which of the following is NOT the poitive value of $\sin\theta_1 + \sin\theta_2 + \sin\theta_3$

A. 3

B. -1

C. -2

D. -3

Answer: C

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17. The value of $\cos\left(\cos^{-1}x+\sin^{-1}x\right)atx=\frac{1}{3}$ is

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

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

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

D. $\frac{-2\sqrt{2}}{3}$

Answer: D

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18. If in the given data, the mean of square of deviation about 10 is 25. The variance of same data is

16. If mean of the data is greater than 10, then actual mean of data is

A. 10

B. 13

C. 7

D. None of these

Answer: B

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19. The differential equation of the curve $\frac{x}{a-1}+\frac{y}{a+1}=1$ is given by

A. $(y' - 1)(y + xy') = 2y'$

B. $(y' + 1)(y + xy') = y'$

C. $(y' + 1)(y - xy') = 2y'$

D. None of these

Answer: C

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20. The Sols of $8x = 6[14]$ are

A. $[8], [6]$

B. $[8], [4]$

C. $[6], [13]$

D. $[8], [4], [16]$

Answer: C

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21. If $\sum_{r=1}^{100} r.\left({}^{100}C_r\right)^2 = 50.\ {}^{x}C_{100},$ then value of x is

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22. Number of ways in which from a group of 6 men and 5 women

$M_1, M_2, M_3, M_4, M_5, M_6 \& W_1, aW_2, W_3, W_4, W_5$

committee of 4 people to be formed having atleast 2 women and such that M_1 and W_1 are not in the same committee together is μ. Then $\frac{\mu}{10}$ is

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23. If

$$g(x) = \left(4\cos^4 x - 2\cos 2x - \frac{1}{2}\cos 4x - x^7\right)^{\frac{1}{7}}$$

then the sum of digits of the value of $g(g(100))$ is equal to

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24. The value of

$$12\sum_{r=1}^{\infty}\frac{\left(12r^2+1\right)}{\left(64r^6-48r^4+12r^2-1\right)}$$ is :

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25. In ΔABC, a point P is chosen on side $\overrightarrow{AB}$ so that $AP:PB=1:4$ and a point Q is choosen on the side $\overrightarrow{BC}$ so that $CQ:QB=1:3$. Segment $\overrightarrow{CP}$ and $\overrightarrow{AQ}$ intersects at M. If the ratio $\frac{MC}{PC}$ is expressed as a rational number in the lowest term as $\frac{a}{b}$, then find $|a-b|$.

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26. If ω imaginary cube root of unity then the value of

$$\frac{|3\omega - 2\omega^2||1-\omega|}{|3\omega^2 - 2||\omega^2 - 1|}$$ is

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27. Let $y_n = \frac{1}{n}((n+1)(n+2)\ldots(n+n))^{\frac{1}{n}}$ for each positive integer n. If

$\lim_{n \to \infty} y_n = L$, then $[L] =$

(where [x] is the greatest integer less than of equal to x)

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28. A vartiable circle always touches the line $x + y - 2 = 0$ at (1,1) and cuts the circle $x^2 + y^2 + 4x + 5y - 4 = 0$ at A and B. If the line joining AB always passes through fixed point (α, β), then $\frac{\beta}{\alpha}$ is equal to

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29. If G is the centroid of ΔABC and G' is the centroid of the $\Delta A'B'C'$, and $AA' + BB' + CC' = KGG$, then K is equal to

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30. Find the number of real values of m for which $A \cup B$ has exactly 3 distinct elements, where A and B are following two sets :

$$A = \{x : x^2 + (m-1)x - 2(m+1) = 0, x \in R\}$$

$$B = \{x : (m-1)x^2 + mx + 1 = 0, x \in R\}$$

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