MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 80

Mathematics

1. If f is differentiable and $g(x) = f\left(\frac{1+3x}{1-5x}\right)$ for all $x \neq \frac{1}{5}$. If f'(-1) = 2, then the value of g' (1) is

A. -2

B. -1

C. 0

D. 1

Answer: D

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2. If tangent and normal at point P (in first quadrant) to ellipse $\frac{x^2}{25}+\frac{y^2}{16}=1$ intersect major axis at T and N respectively in such a way that ratio of area of ΔPTN and ΔPSS' is $\frac{91}{60}$ then area of ΔPSS' is (S and S' are foci)

A. $6\sqrt{3}$ sq.units

B. $12\sqrt{3}$ sq.units

C. $4\sqrt{3}$ sq.units

D. $3\sqrt{3}$ sq.units

Answer: A

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3. Statement - 1: The type of "OR" used in the proposition "You may have a voter card or a PAN card for your identity proof" is inclusive OR.

Statement - 2: Inclusive OR is said to be used in a proposition if its component statements both may happen together. 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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4. The number of 3×3 matrices A whose entries are either 0 or 1 and for which the system $A\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$ has exactly two distinct solutions is

A. Zero

B. One

C. Two

D. None of these

Answer: A

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5. If $\Delta = \begin{vmatrix} x^n & x^{n+2} & x^{2n} \\ 1 & x^p & p \\ x^{x+5} & x^{p+6} & x^{2x+5} \end{vmatrix} = 0$, then p is aqual to

A. x^n

B. $(n+1)$

C. either (a) or (b)

D. Both (a) and (b)

Answer: D

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6. Let P be the point on the parabola, $y^2 = 8x$ which is at a minimum distance from the center C of the circle $x^2 + (y+6)^2 = 1$. Then the equation of the circle, passing through C and having its center at P is

A. $x^2 + y^2 - \frac{x}{4} + 2y - 24 = 0$

B. $x^2 + y^2 - 4x + 9y + 18 = 0$

C. $x^2 + y^2 - 4x + 8y + 12 = 0$

D. $x^2 + y^2 - x + 4y - 12 = 0$

Answer: C

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7. Let LL' be the latus rectum through the focus S of a hyperbola and A be the farther vertex of the conic. If Δ ALL' is equilateral then its eccentricity is

A. $\sqrt{3}$

B. $\sqrt{3}+1$

C. $\frac{\left(\sqrt{3}+1\right)}{\sqrt{2}}$

D. $1+\frac{1}{\sqrt{3}}$

Answer: D

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8. Fifteen coupons are numbered 1, 2..... 15 respectively. Seven coupons are selected at random one at a time with replacement. The probability that the largest number appearing on a selected coupon is 9 is

A. $\left(\frac{9}{16}\right)^2$

B. $\left(\frac{8}{15}\right)^7$

C. $\left(\frac{3}{5}\right)^7$

D. None of these

Answer: C

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9. A curve in the co-ordinate plane is given by the parametric equation $x = t^2 + t + 2$ and $y = t^2 - t + 2$ where $t \geq 0$. The number of straight lines passing through the point (2, 2) which are tangent to the curve is/are

A. 2

B. 0

C. 1

D. 3

Answer: C

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10. If $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar vectors then the roots of equation $\left[\vec{b} \times \vec{c} \quad \vec{c} \times \vec{a} \quad \vec{a} \times \vec{b}\right] x^2$ and $+\left[\vec{a}+\vec{b} \quad \vec{b}+\vec{c} \quad \vec{c}+\vec{a}\right] x$

A. real and distinct

B. rational

C. real and equal

D. imaginary

Answer: C

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11. Let $f: R \to R$ be a differential function, such that f(3) = 3 and $f'(3) = \frac{1}{2}$ then $\lim_{x \to 3} \left(\frac{\int_3^{fx} x.\, t^2 dt}{x^2 - 9} \right)$ is

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

B. $\frac{9}{4}$

C. $\frac{-9}{4}$

D. $\frac{9}{2}$

Answer: B

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12. Let $f(x)$ be a continuous function on R and $f(0) = f(2)$, then the equation $f(x) = f(x+1)$ will have :-

A. at least one root in $[0, 1]$

B. at most one root in $[0, 1]$

C. exactly one root in $[0, 1]$

D. no root in $[0, 1]$

Answer: A

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13. If $\int \frac{x^8 + 4}{x^4 - 2x^2 + 2} dx$ then which of the following is correct

A. $I = \frac{x^5}{5} - \frac{2x^3}{3} + 2x + C$

B. $I = \frac{x^5}{5} - \frac{2x^3}{3} - 2x + C$

C. $I = \frac{x^5}{5} + \frac{2x^3}{3} - 2x + C$

D. $I = \frac{x^5}{5} + \frac{2x^3}{3} + 2x + C$

Answer: D

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14. The value of $\frac{\cos 68^\circ}{\sin 56^\circ . \sin 34^\circ . \tan 22^\circ}$ is equal to

A. 1

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

C. 2

D. 3

Answer: C

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15. The area above the x-axis enclosed by the curves $x^2 - y^2 = 0$ and $x^2 + y - 2 = 0$ is

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

B. $\frac{7}{3}$

C. $\frac{8}{3}$

D. $\frac{10}{3}$

Answer: B

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16. If $f(x) = \dfrac{\cos^2 x + \sin^4 x}{\sin^2 x + \cos^4 x}$ for $x \in R$ then number of solution of the equation $|\sin x| = f(x)$ in $[-2\pi, 2\pi]$ is

A. 2

B. 3

C. 4

D. 5

Answer: C

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17. Let $a = \left(\sin^{-1} x\right)^{\sin^{-1} x}, b = \left(\sin^{-1} x\right)^{\cos^{-1} x}, c = \left(\cos^{-1} x\right)^{\sin^{-1} x},$ d and if $= \left(\cos^{-1} x\right)^{\cos^{-1} x} x \in (0, 1)$ then

A. $a > b > d > c$

B. $d > c > a > b$

C. $b > a > d > c$

D. $a > b > d > c$

Answer: B

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18. The average salary of all the workers in a workshop is Rs. 8000. Out of them average salary of 7 technicians is Rs. 12000 and of rest of the workers is Rs. 6000. Then the number of workers in the workshop is

A. 20

B. 21

C. 22

D. 23

Answer: B

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19. If y = y(x), satisfy the differential equation $\frac{dy}{dx} = \frac{\sin x + e^x}{6y + 2}$ where $y(0) = \frac{4}{3}$, then

A. $8 - \cos x + 2y + e^x + 3y^2 = 0$

B. $8 - \cos x - 2y + e^x - 3y^2 = 0$

C. $6 - \cos x + 2y + e^x + 3y^2 = 0$

D. $6 - \cos x - 2y + e^x + 3y^2 = 0$

Answer: B

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20. If A = {1, 2, 3} and B = {3, 8}, is then $(A \cup B) \times (A \cap B)$

A. $\{(3, 1), (3, 2), (3, 3), (3, 8)\}$

B. $\{(1, 3), (2, 3), (3, 3), (8, 3)\}$

C. $\{(1, 2), (2, 2), (3, 3), (8, 8\}\}$

D. $\{(8, 3), (8, 2), (8, 1), (8, 8)\}$

Answer: B

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21. Coefficient of x^3 in the expansion of $\sum_{i,j,k,l \in \{1,2\}} (1+x^i)(1+x^j)(1 \text{ is} + x^k)(1+x^l)$

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22. Let f(n) denote the number of different ways in which the positive integer 'n' can be expressed as the sum of 1s and 2s. Note that order of 1s and 2s should be taken into consideration. If f(f(6) - 5f (6)) – 5f (6) = abc, where a, b, c are the digits of the number, then the value of a + b + c =

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23. If |ln x| = bx has exactly 3 distinct solutions then [b] = _____ (where [.] is greatest integer function)

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24. $S_n = \sum_{r=1}^{n} t_r = \frac{n\left(2n^2 + 9n + 13\right)}{6}$ Find $\sum_{t=1}^{\infty} \frac{1}{r\sqrt{t_r}}$

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25. If the coordinates of the point where the line $x - 2y + z - 1 = 0 = x + 2y - 2z - 5$ inte the plane $x + y - 2z = 7$ is (α, β, γ) then find the value of $(|\alpha| + |\beta| + |\gamma|)$

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26. Let $|z-(1+i)=2\sqrt{2}$ then the maximum value of [|z|] (Where [.] is greatest integer function)

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27. Let $f(x)=\lim_{n\to\infty}\left(\frac{n!}{n^n}\right)^{\frac{1}{n}}$, then the value of $\left[e^2 f(x)\right]$ is (where [.] denotes GIF)

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28. Three circle touches one another externally. The radius of circles are three consecutive integers. The tangent at their point of contact meet at a point whose distance from a point of contact is 4. The ratio of radius of largest to smallest circle is

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29. Find the value of x for which the points (x, -1), (2, 1) and (4,5) are collinear

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30. If it is given that $\sqrt{n}+\sqrt{n+1}<11$ then find the number of positive integers n which are divisible by 3

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