MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 58

Mathematics

1. The term independent of x in the expansion of $\left[\left(t^{-1}-1\right)x+\left(t^{-1}+1\right)^{-1}x^{-1}\right]^{8}$ is :

A. $56\left(\frac{1-t}{1+t}\right)^{3}$

B. $56\left(\frac{1-t}{1-t}\right)^{3}$

C. $70\left(\frac{1-t}{1+t}\right)^{4}$

D. $70\left(\frac{1+t}{1-t}\right)^{4}$

Answer: C

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2. Let α_1, α_2 and β_1, β_2 are roots of the equation $ax^2 + bx + c = 0$ and $px^2 + qx + r = 0$ respectively. If the system of equations $\alpha_1 y + \alpha_2 z = 0$ and $\beta_1 y + \beta_2 z = 0$has a non trivial solution, then

A. $bpr^2 = qac^2$

B. $b^2pr = q^2ac$

C. $bp^2r = qa^2c$

D. none of these

Answer: B

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3. The value of $\sum_{r=1}^{50} \frac{1^3 + 3^3 + 5^3 + \ldots . + (2r-1)^3}{1 + 3 + 5 + \ldots + (2r-1)}$:

A. 85800

B. 85700

C. 85600

D. 85500

Answer: A

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4. If $P = \{x \in R : f(x) = 0\}$ and $Q = \{x \in R : g(x) = 0\}$, then $P \cup Q$ is

A. $\{x \in R : f(x) + g(x) = 0\}$

B. $\{x \in RLf(x)g(x) = 0\}$

C. $\left\{x \in R : (f(x))^2 + (g(x))^2 = 0\right\}$

D. none of these

Answer: B

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5. If the length of a focal chord of parabola $y^{=}4x$is $\frac{25}{4}$ and has a positive slope, then the slope of the focal chord will be

A. $\sqrt{3}$

B. $\frac{1}{\sqrt{3}}$

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

D. 1

Answer: C

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6. If $(a, b), (c, d), (e, f)$ are the vertices of a triangle such that a, c, e are in G. P. with common ratio r and b, d, f are in G. P. with common ratio s, then the area of the triangle is

A. $\frac{ab}{2}(r+1)(s+2)(s+r)$

B. $\frac{ab}{2}(r-1)(s-1)(s-r)$

C. $\frac{ab}{2}(r-1)(s+1)(s-r)$

D. $(r+1)(s+1)(s-r)$

Answer: B

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7. Let $\left|\vec{a}\right| = 2, \left|\vec{b}\right| = 5$. The possible value of k for which the vectors $\vec{a} + k\vec{b}$ and $\vec{a} - k\vec{b}$ are perpendicular is

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

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

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

D. $\frac{2}{25}$

Answer: A

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8. Which of the following function is surjective but not injective?

A. $f: R \to R, f(x) = x^4 + 2x^3 - x^2 + 1$

B. $f: R \to R, f(x) = x^3 + x + 1$

C. $f: R \to R^+, f(x) = \sqrt{1 + x^2}$

D. $f: R \to R, f(x) = x^3 + 2x^2 - x + 1$

Answer: D

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9. If $\lim_{x \to 1} \frac{ax^3 + bx^2 + cx + d}{(x-1)^3}$ exists and finite, then $\frac{b + c + d}{a}$ is equal to

A. -1

B. 0

C. 1

D. 7

Answer: A

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10. If $y = f(x)$ satisfies the condition $f(x) = f(4-x)\,\forall x \in (0,4), f(x) = f(14-2)\,\forall x \in [4,10] f(x) = \begin{cases} [x^2 - 2 \\ 3 + \sqrt{2} \\ \frac{20-2x}{3}, \end{cases}$

Then the area bounded by $y = f(x), x = 0, x = 10$ and the x -axis is

A. $\frac{\pi}{2} + 16$

B. $\frac{\pi}{2} + 20$

C. $\frac{\pi}{2} + 32$

D. none of these

Answer: C

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11. If $\int \frac{2\cos x + 3\sin x}{3\cos x + 4\sin x} dx = Ax + B$, then $\ln|3\cos x + 4\sin x| + C(A + B)$ is equal to

A. $\frac{18}{25}$

B. $\frac{19}{25}$

C. $\frac{17}{25}$

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

Answer: C

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12. `~ (p

A. p

B. q

C. $p \wedge -p$

D. $-p \wedge q$

Answer: C

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13. If the standard deviation of the numbers 2, 3, a and 11 is 3.5, then which of the following is true?

A. $3a^2 - 32a + 84 = 0$

B. $3a^2 - 34a + 91 = 0$

C. $3a^2 - 23a + 44 = 0$

D. $3a^2 - 26a + 55 = 0$

Answer: A

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14. Each side of an equilateral triangle subtends an angle of 60° at the top of a tower h meters high located at the centre of the triangle. If a meters is the length of each side of the triangle, then

A. $3a^2 = 2h^2$

B. $2a^2 = 3h^2$

C. $a^2 = 3h^2$

D. $3a^2 = h^2$

Answer: B

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15. The value of x satisfying the equation $\left(\sin^{-1} x\right)^3 - \left(\cos^{-1} x\right)^3 + \left(\sin^{-1} x\right)\left(\cos^{-1} x\right)\left(\sin^{-1} x - \cos^{-1} x\right) = \frac{\pi^3}{16}$ is

A. $\cos\frac{\pi}{5}$

B. $\cos\frac{\pi}{4}$

C. $\cos\frac{\pi}{8}$

D. $\cos\frac{\pi}{12}$

Answer: C

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16. The number of points where the function, $f(x) = \cos|2018\pi - x| + \sin|2020\pi \text{is} - x| + (x - \pi)\left|x^2 - 3\pi x + 2\pi^2\right|$ non-differentiable is/are

A. 0

B. 1

C. 2

D. 3

Answer: C

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17. The hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, the area of the triangle formed by the asymptotes and the tangent drawn to it at (a, 0) is

A. $3ab$

B. ab

C. $2ab$

D. $\frac{1}{3}ab$

Answer: B

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18. Let $f(x)$ is a differentiable function such that $f(x+y) = f(x) + f(y) + 2xy \forall x, y \in R$ and $\lim_{x \to 0} \frac{f(x)}{x} = 210$, then f (2) is equal

A. 20

B. 105

C. 424

D. none of these

Answer: C

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19. If $270^\circ < \theta < 360^\circ$, then $\sqrt{2+\sqrt{2+2\cos\theta}}$ is equal to

A. $-2\sin\left(\frac{\theta}{4}\right)$

B. $2\sin\left(\frac{\theta}{4}\right)$

C. $2\cos\left(\frac{\theta}{4}\right)$

D. $-2\cos\left(\frac{\theta}{4}\right)$

Answer: B

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20. The general solution of the trigonometric equation $\sin x - \cos x = 1$ is given by

A. $x = 2n\pi, n \in I$

B. $x = n\pi + (-1)^n \frac{\pi}{4} + \frac{\pi}{4}, n \in I$

C. $x = 2n\pi + \frac{\pi}{2}, n \in I$

D. $x = n\frac{\pi}{2}, n \in I$

Answer: B

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21. If ω is non real root of equation $x^3 - 1 = 0$ then value of $\sum_{r-1}^{5} \left(1 + \omega^r + \omega^{2r}\right)$ is

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22. Let A be the set of all 3×3 skew symmetric matrices whose entries are either –1, 0 or 1. If there are exactly three O's three l's and three (-1)'s, then the number of such matrices is

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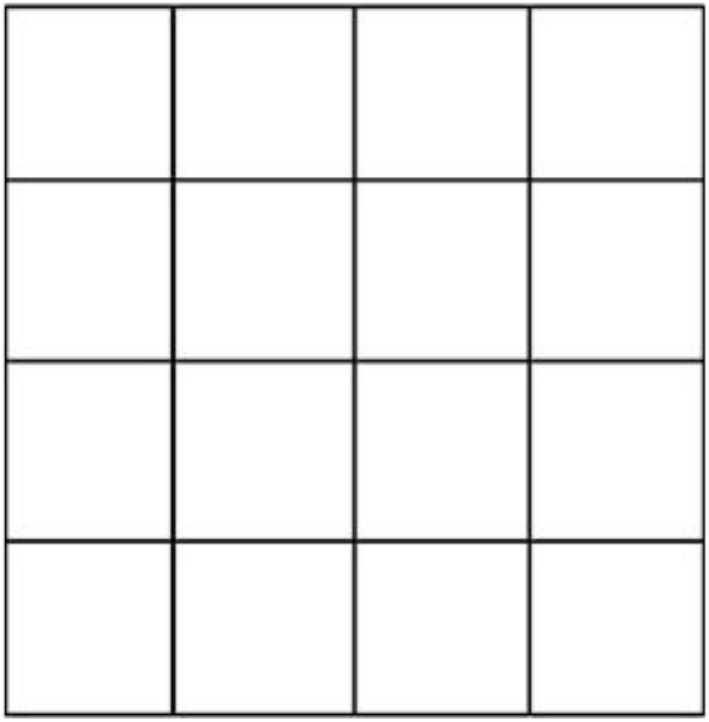
23. The number of the rectangle in the following figure is



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24. If α, β and γ are the roots of the cubic equation $x^3-3x^2+1=0$, then $(\alpha-2)(\beta-2)(\gamma-2)=$

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25. A circle C having center at (1, 2) and radius equal to 3, cuts the members of the family of circles passing through two fixed points P(2, 6) and Q(4, 5), such that the common chords pass through a fixed point (21, yı), then the value of $\left(\frac{y_1-x_1}{7}\right)$ is

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26. Origin O is the centre of two concentric circles whose radii are a and b respectively, $a<b$. A line OPQ iş drawn to cut the inner circle in P and the outer circle in Q. PR is drawn perpendicular to x – axis and QR is drawn perpendicular to the y- axis. The locus of R is an ellipse touching the two

cireles. If the foci of the ellipse lie on the inner circle, if eccentricity is $\sqrt{2}K$, then the value of K is

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27. If the minimum and maximum value of function $3x^4 - 8x^3 + 12x^2 - 48x + 25$ on the interval (0,3] is b and a respectively, then the value a – b is

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28. Through the point P(1, 2, 2) a plane is drawn at right angles to OP, O being the origin, to meet the axes in A, B, C. If the area of triangle ABC is $\frac{240 + \lambda}{8}$ sq. units , then λ equals

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29. A normal is drawn at a point A (x, y) of a curve. It meets the X -axis and Y - axis at point P and Q respectively such that $\frac{1}{OP}+\frac{1}{OQ}=1$ where O is the origin. Then, the equation of such a curve passing through (5, 4) is

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30. $\int_0^5 [x]\{x\}dx$ (where [.]denotes greatest integer function and{.} denotes fractional part of function is

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