MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 67

Mathematics

1. If for the complex number z_1 and $z_2, |z_1 + z_2| = |z_1 - z_2|$ is equal to

A. π

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

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

D. 4

Answer: B

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2. If $\Delta_1 = \begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix}, \Delta_2 = \begin{vmatrix} 1 & a & bc \\ 1 & b & ca \\ 1 & c & ab \end{vmatrix}$ then

A. $\Delta_1 + \Delta_2 = 0$

B. $\Delta_1 = \Delta_2$

C. $\Delta_1 + 2\Delta_2 = 0$

D. $\Delta_1 - 2\Delta_2 = 0$

Answer: B

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3. The number of ways in which a mixed doubles game can be arranged from amongst n couples such that no husband and wife play in the same game is

(Note : Mixed doubles is a match in which a man and a woman play as partners against another man and woman.)

A. ${}^{n}P_{4}$

B. ${}^{n}C_{4}$

C. $\frac{1}{2}({}^{n}P_{4})$

D. $\frac{1}{2}({}^{n}C_{4})$

Answer: C

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4. If $S_n = \frac{1}{1.3.4} + \frac{1}{2.4.5} + \ldots$ then $+ \frac{1}{n(n+2)(n+3)}$

$\lim S_n$ is equal to $n \to \infty$

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

B. $\frac{5}{36}$

C. $\frac{5}{12}$

D. $\frac{5}{6}$

Answer: B

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5. If the chords of the hyperbola $x^2 - y^2 = 16$ touches the parabola $y^2 = 16x$, then the locus of the middle points of these chords is a curve

A. $y^2(x+4) = x^3$

B. $y^2(x-4) = x^3$

C. $v^2(x+8) = 3x^3$

D. $y^2(x-8) - 2x^3$

Answer: B

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6. Let A (-2, 2) and B (2,-2) be two points. P is a variable point such that area of ΔPAB is 8 then locus of P is

A. $x + y = \pm 1$

B. $x + y = \pm 2$

C. $x + y = \pm 3$

D. $x + y = \pm 4$

Answer: D

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7. The distance of point of intersection of lines $\frac{x-4}{1} = \frac{y+3}{-4} = \frac{z+1}{7}$ and $\frac{x-1}{2} = \frac{y+1}{-3} = \frac{z+10}{8}$

from (1, -4,7), is

A. $\sqrt{15}$

B. $\sqrt{27}$

C. $\sqrt{26}$

D. $\sqrt{14}$

Answer: C

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8. Given $\left|\vec{a}\right| - \left|\vec{b}\right| = 1$ and $\left|\vec{a} + \vec{b}\right| = \sqrt{3}$, if $\vec{c}$ be a vector such that $\vec{c} - \vec{a} - 2\vec{b} = 3\left(\vec{a} \times \vec{b}\right)$,, then $\vec{c} . \vec{b}$ is equal to

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

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

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

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

Answer: D

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9. let

$$= \begin{cases} \frac{ax^2+bx+c(\cot x)^n}{4+(\cot x)^n} & , x \in \left(0, \frac{\pi}{4}\right) \\ 1 & , \text{ at } x = \frac{\pi}{4}, \\ \frac{\sin x+\cos x+(\tan x)^n}{1+c(\tan x)^n} & , x \in \left(\frac{\pi}{4}, \frac{\pi}{2}\right) \end{cases}$$

where a, b, c are real constants and $f(x) = \lim_{n \to \infty} g(x)$.

If

$\lim_{x \to \frac{\pi}{4}}$ f(x) exists, then c may be $x \to \frac{\pi}{4}$ equal to

A. 1

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

C. 3

D. -1

Answer: D

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10. If $f(x)$ be differentiable function and curve $y = f(x)$ passes through (1, 1) and satisfies the relation

$2f(x+y)+f(x-y)+3y^2$ then $=3f(x)+2xy$,

$\lim_{x\to 1}\frac{f(x)-1}{x-1}$ is equal to

A. 3

B. 0

C. 2

D. 1

Answer: C

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11. If

$2y\sin x\frac{dy}{dx}=\sin 2x-y^2\cos x$ and $atx=\frac{\pi}{2}, y=1,$

then

A. $y^2 = 1 + \cos x$

B. $y = \sin^2 x$

C. $y^2 \sin x = 1 + \cos x$

D. $y^2 = \sin x$

Answer: D

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12. If $\int \left(\frac{x^2 - x + 1}{x^2 + 1} \right) . e^{\cot^{-1} x} dx = A(x) . e^{\cot^{-1} x} + C,$ where C is constant of integration, then A(x) is equal to

A. $-x$

B. $\sqrt{1 - x}$

C. x

D. $\sqrt{1+x}$

Answer: C

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13. The value of x in $(0, \frac{\pi}{2})$ satisfying equation $\frac{\sqrt{5}-1}{\sin x}+\frac{\sqrt{10+2\sqrt{5}}}{\cos x}$=8` is

A. $\frac{\pi}{8}$

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

C. $\frac{\pi}{10}$

D. none of these

Answer: C

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14. Rectangle ABCD has area 200 sq. unit. An ellipse with area 200π. unit passes through A and C has focii at B and D. Then perimeter of the rectangle ABCD is

A. 80 unit

B. 40 unit

C. 20 unit

D. 60 unit

Answer: A

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15. Number of solutions of the equations $y = \frac{1}{3}[\sin x + [\sin x + [\sin x]]]$ and $[y + [y]] = 2\cos x$, where [.] denotes the greatest integer function is:

A. 0

B. 1

C. 2

D. infinite

Answer: A

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16. If $\frac{\sin^{-1}(2a)}{1+a^2} + \sin^{-1}\frac{2b}{1+b^2}$ then x is $= 2ta^{-1}x,$ equal to

A. $\frac{a-b}{1+ab}$

B. $\frac{b}{1+ab}$

C. $\frac{b}{1-ab}$

D. $\frac{a+b}{1-ab}$

Answer: D

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17. If the line $2x + y + k = 0$ is a mormal to the parabola $y^2 + 8x = 0$, then the value of k is

A. -16

B. -8

C. -24

D. 24

Answer: D

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18. The coefficient of variation of 10 observations, if the sum of squares of deviations taken from their mean 50 is 250, is

A. 0.1

B. 0.4

C. 0.5

D. 0.01

Answer: A

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19. The logical proposition $(\sim(\sim p \vee q) \vee (p \wedge r)) \wedge (\sim q \wedge r)$ is equicalent to

A. $(\sim p \wedge \sim q) \wedge r$

B. $(p \wedge r) \wedge \sim q$

C. $(p \wedge \sim q) \vee r$

D. $\sim p \vee r$

Answer: B

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20. The area enclosed by $y = g(x), \quad x = -3, \quad x = 5$ and x-axis where g(x) is the inverse of $f(x) = x^3 + 3x + 1$ is

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

B. 3

C. $\frac{7}{2}$

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

Answer: D

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21. The expansion of $\left(1+x+x^2\right)^n$ is $a_0+a_1x+a_2x^2+\ldots+a_{2n}x^{2n}$. Find the value of $\frac{a_0+a_1+a_3+a_4+\ldots.}{a_2+a_5+a_8+\ldots.}=$

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22. If $\begin{bmatrix} \frac{-1+i\sqrt{3}}{2i} & \frac{-1,i\sqrt{3}}{2i} \\ \frac{i+i\sqrt{3}}{2i} & \frac{1-i\sqrt{3}}{2i} \end{bmatrix}$, $i=\sqrt{-1}$ and $f(x)=x^2+2$ Then $\left|\frac{f(A)}{\left(2+i\sqrt{3}\right)}\right|$ is equal to

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23. For the quadratic equation $6x^2 + 11x + 3 = 0$, if α and β are the roots, then the value of $(6\alpha + 11)^2 + (6\beta + 11)^2$ is

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24. if $5f(x) + 3f\left(\frac{1}{x}\right) = x + 2$ and $y = xf(x)$, then $\left(\frac{dy}{dx}\right)_{x=1}$ is equal

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25. Find the length of PQ such that the tangent at the point P on the circle $x^2 + y^2 + 6x + 6y = 2$ meets the straight line $5x - 2y + 6 = 0$ at a point Q on the y-axis.

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26. A 2×2 matrix is fromed with entries from the set $\{0, 1\}$, The probability that it is singular is

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27. Let f be a function defined on R such that

$f'(x) = 2018(x - 2017)(x - 2018)^2$

$(x - 2020)^4 . (x - 2019)^3$ for all $x \in R$. If g is a function

defined an R, with values in $(0, \infty)$ such that $g(x) = e^{f(x)}$ for all $x \in R$, then the numder of points of reletive aptima will be:

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28. If $2x = y^{\frac{1}{3}} + y^{-\frac{1}{3}}$, $\left(x^2 - 1\right)y'' + xy'$ $= ky$

k is equal to.

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29. The velue of $\int_0^{\frac{\pi}{2}} \frac{1 + \cos 3x}{2\cos x - 1} dx$ is:

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30. The lines $x + y = 0, x - 4y = 0$ and $2x - y = 0$ are the altitudes of a triangle. If one of the altitudes of a triangle. If one of the vertices has the coordinates $(-\lambda, \lambda)$ and the locus of the centroid of this triangle is $ax + by = 0$ (where a and b are positive intergers and coprime to each other), then the value of (a+2b) is

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