MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 50

Mathematics

1. If $x = \left(\sqrt{3}+1\right)^{2n+1}$, then [x] is

[Note: Where [x] is greatest integer function'

A. even $\forall n \in N$

B. odd $\forall n \in N$

C. even if and only if n is even

D. odd if and only if n is odd

Answer: A

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2. The complex number z satisfying $z + |z| = 1 + 7i$ then the value of $\sqrt{|z + \bar{z}|^2 + |z - \bar{z}|^2}$ is

A. 30

B. 40

C. 50

D. None of these

Answer: C

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3. If A dn B are square matrices of same order such that $|A| = |B| = 1$ and

$A(adjA + adjB) = B$. Then the value of $|A|B|$ is

A. 1

B. 2

C. 4

D. None of these

Answer: A

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4. Let A $= \begin{bmatrix} 1 & 2 & 1 \\ 0 & 1 & -1 \\ 3 & -1 & 1 \end{bmatrix}$ then A^{-1} is equal to

A. $\frac{1}{9}\left(A^2 + 3A + I\right)$

B. $= \frac{1}{9}\left(A^2 - 3A + I\right)$

C. $-\frac{1}{9}\left(A^2 - 3A - I\right)$

D. $-\frac{1}{9}\left(A^2 + 3A - I\right)$

Answer: C

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5. The sum of the series

$$8! + \frac{9!}{2!} + \frac{10!}{3!} + \frac{11!}{4!} + \ldots\ldots \quad \text{up to 20}$$

terms is

A. $7!\left({}^{27}C_9 - 1\right)$

B. $8!\left({}^{27}C_{20} - 1\right)$

C. $7!\left({}^{28}C_{20} - 1\right)$

D. $8!\left({}^{28}C_{20} - 1\right)$

Answer: C

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6. If $a_k, (k-1,2,3,4)$ be the roots of the equation $px^4+qx+p=0$, then the equation whose roots are

$$\frac{\alpha_1^5}{(\alpha_2+\alpha_3+\alpha_4)^2.\alpha_2\alpha_3\alpha_4}, \frac{\alpha_2^5}{(\alpha_1+\alpha_3+\alpha_4)^2.\alpha_1\alpha_3\alpha_4}, \frac{\alpha_3^5}{(\alpha_1+\alpha_2+\alpha_4)^2.\alpha_1\alpha_2\alpha_4}, \frac{\alpha_4^5}{(\alpha_1+\alpha_2+\alpha_3)^2.\alpha_1\alpha_2\alpha_3}$$ is

A. $p^4x^4+4p^3qx^3+6p^2q^2x^2$

$+(4pq^3-q^4)x+q^4=0$

B. $q^4x^4 + 4p^3x^3 + 6p^2x^2$

$+ \left(4q - p^4\right)x + 1 = 0$

C. $p^4x^4 - 4p^3qx^3 + 6p^2q^2x^2$

$- \left(4pq^3 - q^4\right)x + 1 = 0$

D. $q^4x^4 - 4p^3x^3 + 6p^2x^2$

$- \left(4q - p^4\right)x + 1 = 0$

Answer: A

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7. The sum of the n terms of the series

$\frac{1}{2}+\frac{3}{4}+\frac{7}{8}+\frac{15}{16}+$ .....is

A. $n-1-2^{-n}$

B. 1

C. $n-1+2^{-n}$

D. $1+2^{-n}$

Answer: C

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8. Consider the following statements

1. Identify , relation in a finite set A is the greatest relation in A.

2. The universal relation in a set containing at least 2 elements is non anti symmetric

3. The union and intersection of two symmetric relations are also symmetric relations.

Whcih of these is/are correct?

A. only1

B. 2 and 3

C. 1 and 3

D. all of these

Answer: B

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9. Inside the circle $S: x^2 + y^2 = 4$, there are 3 smaller circles of equal radius a, tangent to each other and to S. The value of a equals.

A. $2\sqrt{2}\left(\sqrt{2} - 1\right)$

B. $2\sqrt{3}(2-\sqrt{3})$

C. $2\sqrt{2}(2-\sqrt{3})$

D. $2\sqrt{3}(\sqrt{3}-1)$

Answer: B

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10. The equation of tangent at the vertex of parabola $x^2+8x+4=0$ is

A. $x=-4$

B. $y = 8$

C. $y = 4$

D. $y = -8$

Answer: C

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11. Let A(-3,2) and B(-2,1) be the vertices of a ΔABC.I f the centroid of ΔABC lies on the line $3x + 4y + 2 = 0$. Then the locus of vertex C is

A. $3x + 4y + 3 = 0$

B. $4x + 3y + 5 = 0$

C. $3x + 4y + 5 = 0$

D. $3x + 4y - 1 = 0$

Answer: A

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12. The coordinates of the foot of perpendicular from the point $(1, 0, 0)$ to the line $\frac{x-1}{2} = \frac{y+1}{-3} = \frac{z+10}{8}$ are

A. $(2, -3, 8)$

B. $(1, -1, -10)$

C. $(5, -8, -4)$

D. $(3, -4, -2)$

Answer: D

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13. Given that $\vec{a}$ is $\perp$ to $\vec{b}$ and p is a non zero scalar if $p\vec{r} + \left(\vec{r} . \vec{b}\right)\vec{a} = \vec{a}c$ then

$\vec{r}$ equals

A. $\frac{\vec{c}}{p} - \left[\left(\vec{b} . \vec{c}\right)\vec{a}\right]/p^2$

B. $\vec{a}/p - \left[\left(\vec{c} . \vec{a}\right)\vec{b}\right]/p^2$

C. $\vec{b}/p - \left[\left(\vec{a} . \vec{b}\right)\vec{c}\right]/p^2$

D. None of these

Answer: A

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14. If $f(x) = 3x^{10} - 7x^8 + 5x^6 - 21x^3$ then

$+3x^2 - 7$

$\lim_{\alpha \to 0} \frac{f(1-\alpha) - f(1)}{\alpha^3 + 3\alpha}$ is

A. $-\frac{53}{3}$

B. $\frac{53}{3}$

C. $-\frac{55}{3}$

D. $\frac{55}{3}$

Answer: B

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15. The number of positive real roots of equation

$(x-1)(x-2)(x-3)$ is

$+(x-1)(x-2)(x-4)$

$+(x-2)(x-3)(x-4)$

$+(x-1)(x-3)(x-4)=0$

A. 0

B. 2

C. 1

D. No real roots

Answer: C

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16. Let $y = f(x)$ be a function satisfying the differential equation $x\frac{dy}{dx} + 2y = 4x^2$ and $f(1) = 1$ then $f(-3)$ is equal to

A. 9

B. -3

C. 0

D. 0

Answer: A

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17. Let

$$\int \frac{\sqrt{x}}{\sqrt{x^3+8}}dx = \lambda \text{In} \mid x^{\frac{3}{2}} + \sqrt{x^3+8} \mid + C,$$

then $\{\lambda\}$ is equal to

[Not: {.} denotes the fractional part of function]

A. $\frac{1}{3}$

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

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

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

Answer: B

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18. An observer on the top of a tree finds the angle of depression of a ar moving towards the tree to be 30° .After 3 minutes the angle is observed as 60°. After how much more time, the care will reach the tree?

A. 4 minutes

B. 4.5 minutes

C. 1.5 minutes

D. 2 minutes

Answer: C

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19. Suppose x and y are real numbers and that $x^2 + 9y^2 - 4x + 6y + 4 = 0$, then the minimum value of $(4x - 9y)$ is

A. 1

B. 4

C. 5

D. 6

Answer: D

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20. The value of $\cos\left(\frac{1}{2}\cos^{-1}\left(\cos\left(\sin^{-1}\frac{\sqrt{63}}{8}\right)\right)\right)$ is

A. $\frac{3}{16}$

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

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

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

Answer: C

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21. A tangent to the hyperbola $x^2 - 2y^2 = 4$ meets x-axis at P and y-axis at Q. Lines PR and QR are drawn such that OPRQ is a rectangle (O

beng origin). If the locus of R is $\frac{\lambda}{x^2} - \frac{2}{y^2} = 1$, then the value of λ is equal to

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22. A function f is defined as $f(x) = \frac{k - x^2 + 3x}{-4 + x}$ where k isa parameter, then the greatest integral value of k so that function f has a relative minimum and a relative maximum is

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23. If $\lim_{x \to 0} \left(\tan\left(\frac{\pi}{4} + x\right)\right)^{\frac{3}{x}} = e^m$, then the value of m is equal to

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24. The value of $\int_{\pi}^{10\pi} |\sin x| dx =$

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25. The value of variance ofhe variates 102,105,108,112,123 about their arithmetic mean

is

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26. If $n \in N, n \leq 5$, then the probability that the roots of the equation $x^2 + nx + \frac{1}{2} + \frac{n}{2} = 0$ are real is equal to

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27. Let

$$f(x)=\begin{cases} ax(x-1)+b & x<1 \\ x-1 & 1\le x\le 3 \\ px^2+qx+2 & x>3 \end{cases}$$

Also f is continuous for all x, f is not differentibale at x=1 and f' is continuous at x=3.

If $a \in (-\infty, k) \cup (k, \infty)$ then the value of $3p+k+q-b$ is equal to

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28. If the area bounded by the curves $y=\sqrt{x}, 2y+3=x$ and the x-axis in the first

quadrant is m^2, then the value of m is equal to

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29. The sum of infinite decreasing GP, such that the sum of whose first three terms is equal to 7 and the product of the same three terms is 8, is equal to

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30. If $\frac{2\cos\theta}{1-\cos\theta-\sin\theta}=\frac{4}{5}$, then evaluate $\frac{1-\cos\theta+\sin\theta}{\cos\theta-1}$

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