MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 71

Mathematics

1. Let $p(X) = x^5 + 2x + 2019$ and $q = p^{-1}$ denote the inverse function of p. The value of q'(2019) is

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

B. 2

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

D. 4

Answer: A

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2. A straight line PQ touches ellipse $\frac{x^2}{(3)^2}+\frac{y^2}{(1)^2=1}$ and circle $x^2+y^2=4$. RS is a focal chord of ellipse. If RS is parallel to PQ and RS

meets the circle at points R' and S', then the length of R'S' is

A. 1 unit

B. 2 unit

C. 3 unit

D. 4 unit

Answer: B

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3. Number of one to one functions from the set $X = \{a, b, c\}$ to the set Y={1,2,3,4} is

A. 10

B. 24

C. 30

D. 40

Answer: B

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4. For two statements p and q, the compound statement $\sim(\sim p \vee q) \vee (p \wedge q)$ is equivalent to

A. $q \wedge p$

B. p

C. q

D. $\sim q$

Answer: B

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5. If $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$ then

A. $A^3 = 9A$

B. $A^3 = 27A$

C. $A + A = A^3$

D. A^4 exists

Answer: A

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6. The locus of the foot of perpendicular drawn from focus upon a variable tangent to the parabola $(2x - y + 1)^2 = \frac{8}{\sqrt{5}}(x + 2y + 3)$ is

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

B. $2x - y + 1 = 0$

C. $x + 2y + 3 = 0$

D. None of these

Answer: C

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7. A circle and rectangular hyperbola meet in four points A,B, C and D. If the line AB passes through the centre of the circle. Then the centre of the hyperbola lies at the

A. poit A

B. point B

C. mid point of AB

D. mid poit of CD

Answer: D

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8. If $b_{n+1} = \dfrac{1}{1-b_n}$ of $n \geq 1$ and $b_1 = b_3$, then $\sum_{r=1}^{2001} b_4^{2001}$ is equal to

A. 2001

B. -2001

C. 0

D. None of these

Answer: B

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9. Probability of n heads in 2n tosses of a fair coin is given by

A. $\prod_{r=1}^{n}\left(\frac{2r-1}{2r}\right)$

B. $\prod_{r=1}^{n}\left(\frac{n+r}{2r}\right)$

C. $\sum_{r=0}^{n}\frac{{}^{n}C_{r}}{2^{2n}}$

D. $\frac{\sum_{r=0}^{n}\left({}^{n}C_{r}\right)^{2}}{\left(\sum_{0}^{n}{}^{n}C_{r}\right)^{2}}$

Answer: A

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10. If an equation of a tangent to the curve $yh - \cos(x+y),\ -1 \leq x \leq 1+\pi$ is $x + 2y = k$ then k is equal to

A. 1

B. 2

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

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

Answer: D

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11. The value of $\lim_{\theta \top i} \left[\frac{\sec^2 \theta + 12 \sec \theta + 11}{\sec \theta + 1} \right]$ is equal to

A. 9

B. 10

C. 11

D. 12

Answer: A

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12. If $A, B \in R$ such that the function f(x) is

$$\begin{cases} (\pi) & If x \in [0,4] \\ B\tan^{-1}\frac{2}{x-4} & If x \in (4,6) \\ \sin^{-1}(7-x)+A\frac{\pi}{4} & \text{if } x \in [6,8] \end{cases}$$

continuous if [0,8] then A^2+B^2 is qual to

A. 1

B. 2

C. 3

D. 4

Answer: B

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13. $\int \frac{dx}{x^2(x^n+1)^{\frac{n-1}{n}}} = -(f(x))^{\frac{1}{n}} + C$, then f(x) is

A. $1 + x^n$

B. $1 + x^{-n}$

C. $x^n + x^{-n}$

D. None of these

Answer: B

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14. let $k = \tan^{-1}\left(\frac{\sin\frac{\pi}{18} + \sin\frac{2\pi}{18}}{\cos(\text{pi})/18 + \cos\frac{2\pi}{18}}\right)$ then k equals

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

B. $\frac{\pi}{12}$

C. $\frac{\pi}{15}$

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

Answer: B

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15. The area bounded by the lines $y = 2, x = 1, x = a$ and the curve $y = f(x)$, which cuts the lines $x = 1,\ x = a$ and above the line $y = 2$ for all $a \geq 1$ is equal to $\frac{2}{3}\left[(2a)^{3/2} - 3a + 3 - 2\sqrt{2}\right]$. Then $f(x) =$

A. $2\sqrt{2x}, x \geq 1$

B. $\sqrt{2x}, x \geq 1$

C. $2\sqrt{x}, x \geq 1$

D. x

Answer: A

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16. If $8\cos y = \dfrac{4x^2+4x+7}{x^2+x+1}, x \in R$ then the range of $\sin^2 y + \cos y + 1$ is

A. $\left[1, \dfrac{9}{4}\right]$

B. $\left[1, \dfrac{13}{4}\right]$

C. $\left[2, \dfrac{9}{4}\right)$

D. $\left[3, \dfrac{13}{4}\right)$

Answer: C

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17. If the equations $x^3 + bx^2 + cx + 1 = 0, (b < c)$ has only one rea root α. Then the value of $2\tan^{-1}(\cos ec\alpha) + \tan^{-1}(2) + \tan^{-1}\left(2\sin\alpha\sec^2\alpha\right)$ is

A. $-\pi$

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

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

D. π

Answer: A

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18. A data has highest value 120 and lowest value 71. A frequency distribution in descending order with 7 classes to be constructed. The limits of the second class interva can be ..

A. 71 and 78

B. 78 and 85

C. 113 and 120

D. 106 and 113

Answer: B

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19. If $(x+y)^2 \frac{dy}{dx} = a^2, y = 0$ when $x = 0,$ then y=a the value of $\frac{x}{a}$ is equal to

A. 2

B. $\tan 2$

C. $\tan 2 + 1$

D. $\tan 1 - 1$

Answer: D

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20. If A and b are any two sets, then $A \cap (A \cap B)$ is equal to

A. A

B. B

C. A^C

D. B^C

Answer: A

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21. If the coefficients of 2nd, 3rd and 4th terms in the binomial expansion of $(1+x)^{2n}$ are in A.P., then the value of $2n^2 - 9n + 8$ is

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22. If $I = \begin{bmatrix} 1 & -\tan\theta \\ \tan\theta & 1 \end{bmatrix} \begin{bmatrix} 1 & \tan\theta \\ -\tan\theta & 1 \end{bmatrix}^{-1}$, then

$= \begin{bmatrix} a & -b \\ b & \alpha \end{bmatrix}$

$(a^2 + b^2)$ is equal to .....

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23. Consider two real valued functions f(x) & g(x) satisfy the equations

$g(X) = f(x) - 5$ and

$f(x) - f(2 - x) = 0, x \in R$ then

$g(2) + g(4) + g(6) - g(0) - g(-2) - g(4)$ is equal to

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24. Let P be a point be a point in the first octant, whose image Q in the pane $x + y = 3$ lies on the z-axis. Let the distance of P from the x-axis be 5. If R

is the image of P in the xy-plane, then the length of PR is .....

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25. If $\vec{a}, \vec{b}, \vec{c}$ are three non coplanar vector such that

$$\left[\vec{a}+\vec{b}+\vec{c}, \vec{c}+\vec{a}-\vec{b}, 2\vec{a}+\vec{b}-c\right]$$

then

$$=k\left[\vec{b}, \vec{c}, \vec{a}\right]$$

find the value of k.

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26. Supose z_1, z_2, z_3 are vertices of an equilateral triangle in an argand plane inscribed in the circle $|z| = 2$. If $z_1 = 1 - i\sqrt{3}$, $z_2 = a + ib$, $z_3 = c + id$

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wher $a, b, c \in R$ and $a > c$, then $|3a + d - c|$ to

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27. Find $\int_0^{100} 3\{\sqrt{x}\}dx$, where {x} denotes the fractional part of x.

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28. If the circle $x^2 + y^2 + 2x - 2ky + 6 = 0$ and $x^2 + y^2 + 2ky + k = 0$ intersects orthogonally, then the positive integral value of k is .....

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29. The point $P(a^2, a + 1)$ lis in the angle between the two given lines, $3x - y + 1 = 0, x + 2y - 5 = 0$ containing the origin. Find the number of integral values of a.

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30. If the first three consecutive terms of a GP are the real roots of the equation $2x^3 - 19x^2 + 57x - 54 = 0$ and k is the sum of infinite number of the terms of this G.P . The the value of $\frac{2k}{9}$ is

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