MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 93

Mathematics

1. The remainder when $(2017)^{2018} + (2018)^{2019} + (2019)^{2020}$ is divided by 5 is

A. 0.02

B. 0.04

C. 0.03

D. 0

Answer: A

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2. The locus of an end of latus rectum of all ellipses having a given major axis, is

A. straight line

B. parabola

C. ellipse

D. circle

Answer: B

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3. Which of the following given statement is logicallly equivalent to $(\sim \pi mpliesq)$

A. $p \wedge q$

B. $p \wedge \sim q$

C. $\sim p \wedge q$

D. $\sim p \wedge \sim q$

Answer: D

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4. If matrix $A = \begin{bmatrix} a & b & c \\ b & c & a \\ c & a & b \end{bmatrix}$ where a,b and c are real positive number abc=1 and $A^T A = I$, then which of the following is true

A. $a^3 + b^3 + c^3 = 4$

B. $a^3 + b^3 + c^3 = 3$

C. $a^3 + b^3 + c^3 = 6$

D. $a^3 + b^3 + c^3 = 0$

Answer: A

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5. If

$f: R \to R, f(x) = \frac{\sin([x]\pi)}{x^2 + 2x + 3} + 2x - 1 + \sqrt{x(x-1) + \frac{1}{4}}$

where [x] denote greatest intergral value less than or equal to x) denotes a function, then number of real solutions of equation $f(x) = f^{-1}(x)$ is

A. 0

B. 1

C. 2

D. 3

Answer: B

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6. α, β be the roots of $x^2 - 3x + a = 0$ and γ, δ be the roots of $x^2 - 12x + b = 0$ and numbers $\alpha, \beta, \gamma, \delta$ (in order) form an increasing G.P. then

A. $a = 3, b = 12$

B. $a = 12, b = 3$

C. $a = 2, b = 32$

D. $a = 4, b = 16$

Answer: C

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7. A dice is trhown three times if getting a composite face considering as a success then men and variance of the

probability distribution of number of success are

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

B. $\frac{1}{2}, \frac{5}{12}$

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

D. None of these

Answer: A

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8. The length of perpendicular from orign to the plane $r.\left(3\hat{i}-4\hat{j}+12\hat{k}\right)=5$ is

A. $5/13$

B. $5/4$

C. $5/12$

D. $5/11$

Answer: A

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9. The range of a such that theline $\left(\log_2\left(1+5a-a^2\right)\right)x-5y-a^2-5=0$ is a normal to the curve xy=1 is

A. $(-\infty, 0)$

B. $(5, \infty)$

C. $(0, 5)$

D. None of these

Answer: C

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10. If z lies on the circle $|z - 2i| = 2\sqrt{2}$, then the value of $\arg\left[\frac{z-2}{z+2}\right]$ is equal to

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

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

C. $\frac{\pi}{6}$

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

Answer: B

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11. $\lim_{x \to 0} \frac{(1+x)^{\frac{1}{x}} - e + \frac{ex}{2}}{x^2}$ equals

A. $\frac{11e}{24}$

B. $\frac{-11e}{24}$

C. $\frac{e}{24}$

D. None of these

Answer: A

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12. $f(x) = \sin \mid x + .$ f(x) is not differentiable at

A. x=0 only

B. all x

C. multiples of π

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

Answer: C

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13. $\int \frac{e^x}{x+2}\{1+(x+2)\log_e(x+2)\}dx$

A. $e^x \log_e(x+2)+C$

B. $\frac{e^x}{x+2}+C$

C. $e^x(x+2)+C$

D. $e^x(x-2)+C$

Answer: A

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14. From origin chord of contact AB is drawn (point A and B lie on the circle) to the circle $x^2 + y^2 - 4x - 6y + 1 = 0$. Then the equation of circle passing through A and B and also passes through origin is

A. $x^2 + y^2 - 4x - 6y = 0$

B. $x^2 + y^2 + 2x + 3y = 0$

C. $x^2 + y^2 + 4x - 6y = 0$

D. $x^2 + y^2 - 2x - 3y = 0$

Answer: D

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15. Consider the curves $y = \sqrt{x}, 2y + 3 = x$. The value of the area bounded by the given curves and the x-axi in the 1st quadrant is

A. 18

B. $\frac{27}{4}$

C. 36

D. 9

Answer: D

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16. If $\theta = \sin^{-1} x + \cos^{-1} x - \tan^{-1} x, 1 \leq x, < \infty$

Then the smallest interval in which θ lies is

A. $\frac{\pi}{2} \leq \theta \leq \frac{3\pi}{4}$

B. $0 \leq \theta \leq \frac{\pi}{4}$

C. $-\frac{\pi}{4} \leq \theta \leq 0$

D. $\frac{\pi}{4} \leq \theta \leq \frac{\pi}{2}$

Answer: B

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17. Mean of 50 observations is calculated to be 4.04 when Mr. X took by mistake 10 instead of 8 for an observation. Then the correct mean would be

A. 4.08

B. 3.95

C. 4.01

D. 4

Answer: D

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18. 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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19. If $\frac{dy}{dx} = \frac{x^2 + y^2 + 1}{2xy}$ and $y(2) = 0$ then the value of y(-2) equals

A. $\sqrt{6}$

B. $\sqrt{2}$

C. 3

D. 4

Answer: A

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20. The product of two of of the four roots of the equation $x^4 - 18x^3 + kx^2 + 200x - 1984 = 0$ is -32, then the value of k is

A. 76

B. 96

C. 86

D. 66

Answer: C

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21. If $u = \cos^{-1}\left(4x^3 - 3x\right)$ and $v = \tan^{-1}\left(\frac{\sqrt{1-x^2}}{x}\right), \frac{1}{2} < x < 1$, find $\frac{du}{dv}$

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22. A pen costs Rs. 11 and a notebook costs Rs. 13. the number of ways in which a person can spend exactly Rs. 1000 to buy pens and notebooks is .....

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23. If A be a 3×3 matrix satisfying

$$A\begin{bmatrix}0\\1\\0\end{bmatrix} = \begin{bmatrix}-1\\2\\3\end{bmatrix}, A\begin{bmatrix}1\\-1\\0\end{bmatrix} = \begin{bmatrix}1\\1\\-1\end{bmatrix}$$

and $A\begin{bmatrix}1\\1\\1\end{bmatrix}=\begin{bmatrix}0\\0\\12\end{bmatrix}$ then find $tr(A)$

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24. If P,Q,R,S are the 4 points of intersection of the circle $x^2+y^2-6x-4y-3=0$ with the curve $y=\frac{2x+10}{x-3}$ with center as C, then the value of $(CP)^2+(CQ)^2+(CR)^2+(CS)^2$ is k, then $\frac{k}{8}=$

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25. For how many integer values of λ the vectors $\vec{a}=(2\lambda)\hat{i}+(\lambda)\hat{j}+(\lambda)\hat{k}$ and $\vec{b}=3\hat{i}-\hat{j}+(1-\lambda)\hat{k}$ include an acute angle

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26. The value of $\int_0^2 \left(\sqrt{1+x^3}\right) + \left(\sqrt[3]{x^2+2x}\right) dx$ is equal to

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27. If $\tan^2\theta = 2\tan^2\phi + 1$, then find the value of $\cos 2\theta + \sin^2\phi$

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28. Consider the equation $\log_{\sqrt{2}\sin x}(1+\cos x) = 2, x \in \left[-\frac{\pi}{2}, \frac{3\pi}{2}\right]$ if the sum of the roots is $\frac{p\pi}{q}$, where GCD(p,q)=1 then evaluate p^2+q^2

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29. What is the number of elements in the set $\{(a, b) : a^2 + b^2 = 50, a, b, \in Z\}$ where Zis the set of integers.

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