MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 109

Mathematics

1. Let $f(x) = -x^2 + x + p$, where p is a real number. If $g(x) = [f(x)]$ and $g(x)$ is discontinuous at $x = \frac{1}{2}$, then p - cannot be

(where $[.]$ represents the greatest integer function)

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

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

C. $\frac{7}{4}$

D. $-\frac{1}{4}$

Answer: A

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2. If n(A) denotes the number of elements in set A and if $n(A) = 4, n(B) = 5$ and $n(A \cap B) = 3$ then $n[(A \times B) \cap (B \times A)] =$

A. 8

B. 9

C. 10

D. 11

Answer: B

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3. The number of integers for which the equation $\sin^{-1} x + \cos^{-1} x + \tan^{-1} x = n$ has real solution(s) is

A. 0

B. 1

C. 2

D. 3

Answer: D

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4. If the straight line $y = x$ meets $y = f(x)$ at P, where $f(x)$ is a solution of the differential equation $\frac{dy}{dx} = \frac{x^2 + xy}{x^2 + y^2}$ such that $f(1) = 3$, then the value of $f'(x)$ at the point P is

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

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

C. 2

D. 1

Answer: D

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5. Two whole numbers are randomly chosen and multiplied, then the chance that their product is divisible by 5 is

A. $\frac{4}{25}$

B. $\frac{9}{25}$

C. $\frac{16}{25}$

D. $\frac{1}{25}$

Answer: B

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6. The minimum value of p for which the lines $3x - 4y = 2, 3x - 4y = 12, 12x + 5y = 7$ and $12x + 5y = p$ constitute the sides of a rhombus is

A. 33

B. 19

C. -19

D. 9

Answer: C

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7. The coefficient of x^6 in the expansion of $(1-x)^8(1+x)^{12}$ is equal to

A. 168

B. -8

C. 28

D. 104

Answer: D

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8. For a complex number Z. If $arg(Z) \in (-\pi, \pi]$, then $arg\left\{1 + \cos.\frac{6\pi}{7} + i\sin.\frac{6\pi}{7}\right\}$ is (here $i^2 = -1$)

A. $\frac{3\pi}{7}$

B. $\frac{2\pi}{7}$

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

D. $-\frac{3\pi}{7}$

Answer: A

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9. If the eccentricity of the hyperbola $\frac{x^2}{16} - \frac{y^2}{b^2} = -1$ is $\frac{5}{4}$, then b^2 is equal to

A. $\frac{256}{9}$

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

C. 9

D. 3

Answer: A

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10. The number of solutions of the equation $\tan x \sin x - 1 = \tan x - \sin x, \forall \in [0, 2\pi]$ is euqal to

A. 1

B. 2

C. 3

D. 4

Answer: B

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11. For

$f: R \to R, f(x) = x^4 - 8x^3 + 22x^2 - 24x,$

the sum of all local extreme value of f(x) is equal to

A. -9

B. -8

C. -17

D. 6

Answer: D

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12. Let $f(n) = \Sigma_{r=1}^{10n}(6 + rd)$ and $g(n) = \Sigma_{r=1}^{n}(6 + rd)$, where $n \in N, d \neq 0$. If $\frac{f(n)}{g(n)}$ is independent of n, then d is equal to

A. 12

B. -6

C. 6

D. -12

Answer: D

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13. The tangent to the parabola $y = x^2 - 2x + 8$ at $P(2, 8)$ touches the circle $x^2 + y^2 + 18x + 14y + \lambda = 0$ at Q. The coordinates of point Q are

A. $(-7, -12)$

B. $(-9, -13)$

C. $(-11, -16)$

D. $\left(-\frac{31}{5}, -\frac{42}{5}\right)$

Answer: D

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14. The value of $\lim_{x \to 0} \frac{(e^x - x - 1)(x - \sin x)\ln(1 + x)}{x^6}$ is equal to

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

B. $\frac{1}{6}$

C. $\frac{1}{12}$

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

Answer: C

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15. The equation of an ex - circle of a triangle formed by the common tangents to the circle $x^2 + y^2 = 4$ and $x^2 + y^2 - 6x + 8 = 0$ is

A. $x^2 + y^2 = 4$

B. $x^2 + y^2 - 6x + 8 = 0$

C. $x^2 + y^2 - 6x + 9 = 0$

D. $x^2 + y^2 = 1$

Answer: A

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16. If the observation 1, 2, 3, ..., n occur with frequency, $n, (n-1), (n-2), \ldots\ldots, 1$ respectively such that the mean of observations is $\frac{13}{3}$, then n is equal to

A. 10

B. 11

C. 12

D. 13

Answer: B

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17. The direction cosines of two lines satisfy $2l + 2m - n = 0$ and $lm + mn + nl = 0.$

The angle between these lines is

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

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

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

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

Answer: B

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18. A statue of height 4 m stands on a tower of height 10 m. The angle subtended by the status at the eyes of an observer of height 2m, standing at a distance of 6m from base of the tower is

A. $\tan^{-1}\left(\frac{2}{11}\right)$

B. $\tan^{-1}\left(\frac{4}{3}\right)$

C. $\tan^{-1}(2)$

D. $\tan^{-1}\left(\frac{7}{13}\right)$

Answer: A

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19. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 4 \\ 2 & 5 \\ 3 & 6 \end{bmatrix}$,

then the determinant value of BA is

A. 8

B. 0

C. -8

D. 24

Answer: B

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20. The area bounded by the curve $y = \cos x$ and $y = \sin 2x$, $\forall x \in \left[\frac{\pi}{6}, \frac{\pi}{2}\right]$ is equal to

A. $\frac{\pi}{2}$ sq. units

B. $\frac{\pi}{3}$ sq. units

C. `7/4-(3)^(1/2)"sq. units"

D. $\frac{1}{4}$ sq. units

Answer: D

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21. The value of the integral $\int_0^4 \frac{x^2}{x^2 - 4x + 8} dx$ is equal to

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22. Let $\int \frac{x^3+x^2+x}{\sqrt{12x^3+15x^2+20x}}dx = f(x)$ where $f(1) = \frac{\sqrt{47}}{30}$. If $(f(2))^2$ is equal to $\frac{p}{255}$, then the value of p is equal to

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23. Let $A = \begin{bmatrix} 1 & 1 \\ 3 & 3 \end{bmatrix}$ and $B = A + A^2 + A^3 + A^4$. If $B = \lambda A$, $\forall \lambda \in R$, then the value of λ is equal to

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24. The number of permutations of alphabets of the word "ENSHRINE" in which no two alike alphabets are are together is equal to

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25. For three vectors $\vec{a}, \vec{b}$ and $\vec{c}$, If $\left|\vec{a}\right| = 2, \left|\vec{b}\right| = 1, \vec{a} \times \vec{b} = \vec{c}$ and

$\vec{b} \times \vec{c} = \vec{a}$, then the value of $\left[\vec{a} + \vec{b} \quad \vec{b} + \vec{c} \quad \vec{c} + \vec{a}\right]$ is equal to

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