MATHS

BOOKS - JEE MAINS PREVIOUS YEAR ENGLISH

JEE MAIN

MATHS

1. Find the area enclosed by the curves `x^2=y , y=x+2,

A. $4\left(\frac{4}{24}\right)^{1/3}$

B. $4\left(\frac{2}{25}\right)^{1/3}$

C. $2\left(\frac{4}{25}\right)^{1/3}$

D. $2\left(\frac{2}{25}\right)^{1/3}$

Answer: A

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2. Find the mean of 43, 51, 50, 57 and 54.

A. $\frac{10}{\sqrt{3}}$

B. $\frac{10}{\sqrt{2}}$

C. $\frac{10}{3}$

D. $\frac{20}{3}$

Answer: A

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3. Show that the height of the cylinder of maximum volume that can be inscribed in a sphere of radius R is $\frac{2R}{\sqrt{3}}$.

A. $\sqrt{3}$

B. $2\sqrt{3}$

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

D. $3\sqrt{2}$

Answer: B

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4. Using integration, find the area of the triangle formed by positive x-axis and tangent and normal to the circle $x^2 + y^2 = 4$ at $(1, \sqrt{3})$.

A. $\frac{4}{\sqrt{3}}$

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

C. $\frac{8}{\sqrt{3}}$

D. $\frac{5}{\sqrt{3}}$

Answer: B

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5. if $f(x) = \begin{cases} \sin x & x < 0 \\ \cos x - |s - 1| & x \geq 0 \end{cases}$

then g(g) = f(|x|)is non - differentiable for

A. $\{5, 10, 15\}$

B. $\{5, 10, 15, 20\}$

C. $\{10\}$

D. $\{5, 15\}$

Answer: A

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6. Find area bounded by the curves $x^2 \leq y \leq x + 2$

A. $\frac{11}{2}$

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

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

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

Answer: C

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7. In the expansion at $\left(\frac{2}{x}+x^{\log_e x}\right)^6$ if $T_4=20\times 8^7$ then value of x is

A. $8^{\frac{1}{2}}$

B. 8^2

C. 8^3

D. 8^4

Answer: B

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8. If one root fo the quadratic equation $ix^2-2(i+1)x+(2-i)=0, i=\sqrt{-1}$ is $2-i$, the other root is

A. $p^2 - 4q + 12 = 0$

B. p^(2)-4q-12=0`

C. $q^2 - 4q + 12 = 0$

D. $q^2 - 4q - 12 = 0$

Answer: B

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9. If α, β are the roots of $x^2 + x + 1 = 0$ then

$$\begin{vmatrix} Y+1 & \beta & \alpha \\ \beta & y+\alpha & 1 \\ \alpha & 1 & y+\beta \end{vmatrix}$$

A. $y^2 - 1$

B. $y(y^2 - 1)$

C. $u^2 - y$

D. y^3

Answer: D

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10. One end point of a focal chrod of a parabola $y^2 = 16x$ is $(1, 4)$. The length of focal chord is : (A)24 (B)25 (C)20 (D)=22

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11. Find the negation of $p \vee (- p \wedge q)$

A. $-p\tilde{\ } q$

B. ~$p\tilde{\ } q$

C. p~q

D. p^q

Answer: A

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12. A curve $f(x) = x^3 + ax - b$ pass through $p(1, -5)$ and tangent to $f(x)$ at point p is perpendicular to $x - y + 5 = 0$ then which of the following point will lie on curve ? A(2,-2) B(2,-1) C(2,1) D(-2,2)

A. $(2 - 2)$

B. $(2 - 1)$

C. $2, -1)$

D. $(-2, 2)$

Answer: D

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13. There are two family each having two children. If there are at least two girls among the children, find the probability that all children are girls

A. $\frac{1}{9}$

B. $\frac{1}{10}$

C. $\frac{1}{11}$

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

Answer: C

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14. If $\int \frac{dx}{\left(x^2 - 2x + 10\right)^2} = A\left(\tan^{-1}\left(\frac{x-1}{3}\right) + \frac{f(x)}{x^2 - 2x + 10}\right) + C$

,where, C is a constant of integration, then

A. $A = \frac{1}{54}, f(x) = 3(x-1)$

B. $A = \frac{1}{54}, f(x) = 9(x-1)^2$

C. $A = \frac{1}{27}, f(x) = 9(x-1)^2$

D. $A = \frac{1}{81}, f(x) = 3(x-1)$

Answer: A

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15. A $(3, 0, -1)$, $B(2, 10, 6)$ and $(1, 2, 1)$ are the vertices of a triangle. M is the mid point of the line segment joining AC and G is a point on line segment BM dividing $2:1$ ratio internally find $\cos(\angle GOA)$

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

B. $\frac{1}{\sqrt{15}}$

C. $\frac{1}{\sqrt{10}}$

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

Answer: B

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16. Given a point $P(0, -1, -3)$ and the image of P in the plane $3 - y + 4z - 2 = 0$ is Q. Point R is $(3, -1, -2)$ find the area of $\triangle PQR$

A. $\frac{\sqrt{91}}{13}$

B. $\frac{\sqrt{91}}{2}$

C. $\sqrt{\frac{91}{2}}$

D. $\sqrt{91}$

Answer: B

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17. if $\frac{2\sqrt{\sin^2 x - 2\sin x + 5}}{4^{\sin^2} y} \leq 1$ then which option is correct.

A. $2\sin x = \sin y$

B. $|\sin x| = \sin y$

C. $\sin x = |\sin y|$

D. $\sin x = 2\sin y$

Answer: C

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18. Let $g(x)$ be the inverse of an invertible function $f(x)$ which is differentiable at $x = c$. Then $g'(f(x))$ equal. $f'(c)$ (b) $\frac{1}{f'(c)}$ (c) $f(c)$ (d) none of these

A. g(x) is not differentiable at $x = c$

B. for g(x) to be differentiable at c, $f'(c) = 0$

C. for g(x) to be non-differentiable at c, $f'(c) = 0$

D. none of these

Answer: B

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19. if $\int_0^{f(x)} 4x^3 dx = g(x)(x-2)$ if $f(2) = 6$ and $f'(2) = \frac{1}{48}$ then find $\lim_{x \to 2} g(x)$

A. 18

B. 17

C. 20

D. 19

Answer: A

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20. If $[-\sin\theta]y=0$ and $[\cot\theta]x+y=0$ where $[]$ denotes greatest integer function. Then which of the following is correct

A. Infinite solution is $\left(\frac{\pi}{2},\frac{2\pi}{3}\right)$ and a unique solution in $\left(\pi,\frac{7\pi}{6}\right)$

B. Unique solution in $\left(\frac{\pi}{2},\frac{2\pi}{3}\right)$ and infinite solutions in $\left(\pi,\frac{7\pi}{6}\right)$

C. Unique solution is $\left(\frac{\pi}{2},\frac{2\pi}{3}\right)$ and unique solution in $\left(\pi,\frac{7\pi}{6}\right)$

D. Infinite solution in $\left(\frac{\pi}{2},\frac{2\pi}{3}\right)$ and infinite solutions in $\left(\pi,\frac{7\pi}{6}\right)$

Answer: C

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21. $\lim_{x \to 0} \frac{x + 2\sin x}{\sqrt{x^2 + 2\sin x + 1} - \sqrt{\sin^2 x - x + 1}}$

A. 2

B. 1

C. 6

D. -2

Answer: C

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22. If $A \cap B \subseteq C$ and $A \cap B \neq \phi$. Then which of the following is incorrect (1) (A∪B)∩C ≠ϕ (2) B∩C=ϕ (3) A∩C≠ϕ (4) If (A−B)⊆C, then A⊆C

A. $(A \cup B) \cap C \neq \phi$

B. $B \cup C = \phi$

C. $A \cup C \neq \phi$

D. If $(A - B) \subseteq C,$ then $A \subseteq C$

Answer: B

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23. Let $f(x) = 5 - [x - 2]$

$g(x) = [x + 1] + 3$

If maximum value of $f(x)$ is α

& minimum value of $f(x)$ is β

then $\lim_{x \to (\alpha - \beta)} \frac{(x-3)(x^2 - 5x + 6)}{(x-1)(x^2 - 6x + 8)}$ is (A) -1/2 (B)1/2 (C)3/2 (D)-3/2

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

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

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

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

Answer: A

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24. If $\begin{vmatrix} 1+\cos^2\theta & \sin^2\theta & 4\cos 6\theta \\ \cos^2\theta & 1+\sin^2\theta & 4\cos 6\theta \\ \cos^2\theta & \sin^2\theta & 1+4\cos 6\theta \end{vmatrix} = 0$, and $\theta \in \left(0, \frac{\pi}{3}\right)$, then value of θ is

A. $\frac{7\pi}{36}$

B. $\frac{7\pi}{24}$

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

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

Answer: C

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25. A circle touches $x-$ axis at point $(3, 0)$. If it makes an intercept of 8 units on $y-$ axis, then the circle passes through which point A(3,1) B(5,2) C(10,3) D(3,10)

A. $(3, 1)$

B. $(5, 2)$

C. $(10, 3)$

D. $(3, 10)$

Answer: D

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26. The sum of the squares of the length of the chords intercepted on the circle $x^2 + y^2 = 16$, by the lines x +y = n , $n \in N$, where N is the set of all natural numbers, is

A. 160

B. 320

C. 105

D. 210

A. 320

B. 105

C. 160

D. 210

Answer: D

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27. Let A and B be two non-null events such that $A \subseteq B$. Then, which of the following statements is always correct? (1) (P(A/B)=P(B)−P(A) (2) P(A/B)>P(A) (3) P(A/B)≤P(A) (4) P(A/B)=1

A. $p(A/B) = p(B) - P(A)$

B. $P(A/B) > P(A)$

C. $P(A/B) \leq P(A)$

D. $P(A/B) = 1$

Answer: C

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28. If α and β be the roots of the equation $x^2 - 2x + 2 = 0$, then the least value of n for which $\left(\frac{\alpha}{\beta}\right)^n = 1$ is:

A. 2

B. 5

C. 4

D. 3

Answer: C

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29. The area (in sq. units) of the region $A = \{(x, y) \in \mathbb{R} \times \mathbb{R} \mid 0 \leq x \leq 3, 0 \leq y \leq 4, y \leq x^2 + 3x\}$ is:

A. $\frac{53}{6}$

B. 8

C. $\frac{59}{6}$

D. $\frac{26}{3}$

Answer: C

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30. Let S_1 is set of minima and S_2 is set of maxima for the curve $y = 9x^4 + 12x^3 - 36x^2 - 25$ then (A) $S_1 = \{-2, -1\}, S_2 = \{0\}$ (B) $S_1\{-2, 1\}, S_2 = \{0\}$ (C) $S_1 = \{-2, 1\} : S_2 = \{-1\}$ (D) $S_1 = \{-2, 2\}, S_2 = \{0\}$

A. $S_1 = (-2), S_2 = (0.1)$

B. $S_1 = (-2, 0), S_2 = (1)$

C. $S_1 = (-2, 1), S_2 = (0)$

D. $S_1 = (-1), S_2 = (0, 2)$

Answer: C

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31. If $\alpha = \cos^{-1}\left(\frac{3}{5}\right), \beta = \tan^{-1}\left(\frac{1}{3}\right)$, where $0 < \alpha, \beta < \frac{\pi}{2}$, then $\alpha - \beta$ is equa to :

A. $\tan^{-1}\left(\frac{p}{5\sqrt{10}}\right)$

B. $\cos^{-1}\left(\frac{9}{5\sqrt{10}}\right)$

C. $\tan^{-1}\left(\frac{9}{13}\right)$

D. $\sin^{-1}\left(\frac{9}{5\sqrt{10}}\right)$

Answer: B

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32. let $2.\,.^{20}C_0 + 5.^{20}C_1 + 8.^{20}C_2 + ?. + 62.^{20}C_{20}$. Then sum of this series is

A. 2^{26}

B. 2^{25}

C. 2^{23}

D. 2^{24}

Answer: C

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33. if $|\sqrt{x}-2|+\sqrt{x}(\sqrt{x}-4)+2=0$ then find the sum of roots of equation (A) 12 (B) 8 (C) 4 (D) 10

A. 9

B. 12

C. 4

D. 10

Answer: C

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34. if the tangents on the ellipse $4x^2 + y^2 = 8$ at the points (1,2) and (a,b) are perpendicular to each other then a^2 is equal to

A. $\frac{128}{17}$

B. $\frac{64}{17}$

C. $\frac{4}{17}$

D. $\frac{2}{17}$

Answer: C

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35. The value of the integral $\int_0^1 x \cot^{-1}(1 - x^2 + x^4)$ dx is

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

B. $\frac{\pi}{4} - \log_e 2$

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

D. $\frac{\pi}{4} - \frac{1}{2}\log_e 2$

Answer: A

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36. let P be the plane, which contains the line of intersection of the planes $x + y + z - 6 = 0$ and $2x + 3y + z + 5 = 0$ and it is perpendicular to the xy-plane thent he distance of the point (0,0,256) from P is equal to

A. $17/\sqrt{5}$

B. $63\sqrt{5}$

C. $205\sqrt{5}$

D. $11/\sqrt{5}$

Answer: A

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37. If the lines $x+(a-1)y=1$ and $2x+1a^2y=1$ there $a \in R-\{0,1\}$ are perpendicular to each other, Then distance of their point of intersection from the origin is

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

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

C. $\frac{2}{\sqrt{5}}$

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

Answer: A

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38. The point lying on common tangent to the circles $x^2+y^2=4$ and $x^2+y^2+6x+8y-24=0$ is (1) (4,-2) (2) (-6,4) (3) (6,-2) (4) (-4,6)

A. (4,-2)

B. (-6,4)

C. (6,-2)

D. (-4,6)

Answer: D

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39. The mean and median of $10, 22, 26, 29, 34, x, 42, 67, 70, y$ (in increasing order) are 42 and 35 respectively then the value of $\frac{y}{x}$ is (A)9/4 (B)7/2 (C)8/3 (D)7/3

A. $9/4$

B. $7/2$

C. $8/3$

D. $7/3$

Answer: A

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40. If $y(x)$ satisfies the differential equation cosx $\frac{dy}{dx} - y$ sinx $= 6x$. And $y\left(\frac{\pi}{3}\right) = 0$. Then value of $y\left(\frac{\pi}{6}\right)$ is (A) $\frac{\pi^2}{2\sqrt{3}}$ (B) $-\frac{\pi^2}{2}$ (C) $-\frac{\pi^2}{2\sqrt{3}}$ (D) $-\frac{\pi^2}{4\sqrt{3}}$

A. $\frac{\pi^2}{2\sqrt{3}}$

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

C. $-\frac{\pi^2}{2\sqrt{3}}$

D. $-\frac{\pi^2}{4\sqrt{3}}$

Answer: A

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41. The domain of $f(x) = \frac{3}{4 - x^2} + \log_{10}\left(x^3 - x\right)$ (1) $(-1, 0) \cup (1, 2) \cup (3, \infty)$ (2) $(-2, -1) \cup (-1, 0) \cup (2, \infty)$ (3) $(-1, 0) \cup (1, 2) \cup (2, \infty)$ (4) $(1, 2) \cup (2, \infty)$

A. $(-1, 0) \cup (1, 2) \cup (3, \infty)$

B. $(-2, -1) \cup (-1, 0) \cup (2, \infty)$

C. $(-1, 0) \cup (1, 2) \cup (2, \infty)$

D. $(1, 2) \cup (2, \infty)$

Answer: C

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42. If the sum of first 3 terms of an $A.\ P.$ is 33 and their product is $1155.$ Then the 11^{th} term of the $A.\ P.$ Is

A. -35

B. 25

C. 36

D. -25

Answer: B

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43. Find the equations of the tangents to the ellipse $3x^2 + 4^2 = 12$ which are perpendicular to the line $y + 2x = 4$.

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

B. $\frac{\sqrt{61}}{2}$

C. $\frac{\sqrt{221}}{2}$

D. $\frac{\sqrt{157}}{2}$

Answer: A

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44. Consider $f(x) = x\sqrt{kx - x^2}$ for $x\varepsilon[0, 3]$. Let m be the smallest value of k for which the function is increasing in the given interval and M be the largest value of $f(x) f \text{ or } k = m. Then$(m,M)` is

A. $(4, 3\sqrt{2})$

B. $(4, 3\sqrt{3})$

C. $(3, 3\sqrt{3})$

D. $(5, 3\sqrt{6})$

Answer: C

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45. Let S_n denote the sum of the first n terms of an $A.P.$. If $S_4 = 16$ and $S_6 = -48$, then S_{10} is equal to :

A. -260

B. -410

C. -320

D. -380

Answer: C

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46. If the volume of parallelopiped formed by the vectors $\hat{i}+\lambda\hat{j}+\hat{k}$, $\hat{j}+\lambda\hat{k}$ and $\lambda\hat{i}+\hat{k}$ is minimum then λ is equal to (1) $-\frac{1}{\sqrt{3}}$ (2) $\frac{1}{\sqrt{3}}$ (3) $\sqrt{3}$ (4)$-\sqrt{3}$

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

B. $\frac{1}{\sqrt{3}}$

C. $\sqrt{3}$

D. $-\sqrt{3}$

Answer: A

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47. If the line $\frac{x-2}{3}=\frac{y+1}{2}=\frac{z-1}{-1}$ intersects the plane $2x+3y-z+13=0$ at a point P and plane $3x+y+4z=16$ at a point Q then PQ is equal to (A) 14 (B) $\sqrt{14}$ (C) $2\sqrt{7}$ (D) $2\sqrt{14}$

A. 14

B. $\sqrt{14}$

C. $2\sqrt{7}$

D. $2\sqrt{14}$

Answer: C

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48. The derivative of $\tan^{-1}\left(\frac{\sin x - \cos x}{\sin x + \cos x}\right)$, with respect to $\frac{x}{2}$, where $x \in \left(0, \frac{\pi}{2}\right)$ is:

A. 1

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

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

D. 2

Answer: C

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49. The angle of elevation of the loop of a vertical tower standing on a horizontal plane is observed to be 45° from a point A on the plane. Let B be the point $30m$ vertically above the point A. If the angle of elevation of the top of the tower from B be 30°, then the distance (in m) of the foot of the lower from the point A is:

A. $15(3+\sqrt{3})$

B. $15(5-\sqrt{3})$

C. $15(3-\sqrt{3})$

D. $15(1+\sqrt{3})$

Answer: B

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50. If the equation $\cos 2x+\alpha\sin x=2\alpha-7$ has a solution. Then range of α is (A) R (B) $[1, 4]$ (C) $[3, 7]$ (D) $[2, 6]$

A. R

B. $[1, 4]$

C. $[3, 7]$

D. $[2, 6]$

Answer: A

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51. A plane which bisects the angle between the two given planes $2x-y+2z-4=0$ and $x+2y+2z-2=0$, passes through the point: (A) $(1, -4, 1)$ (B) $(1, 4, -1)$ (C) $(2, 4, 1)$ (D) $(2, -4, 1)$

A. $(1, -4, 1)$

B. $(1, 4, -1)$

C. $(2, 4, 1)$

D. $(2, \ -4, 1)$

Answer: A

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52. If distance between the foci of an ellipse is 6 and distance between its directrices is 12, then length of its latus rectum is : (A)4 (B)$3\sqrt{2}$ (C)9 (D) $2\sqrt{2}$

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53.

If $y = \sqrt{\frac{2(\tan\alpha + \cot\alpha)}{1 + \tan^2\alpha} + \frac{1}{\sin^2\alpha}}$ when $\alpha \in \left(\frac{3\pi}{4}, \pi\right)$ then find $\frac{dy}{d\alpha}$ a

A. 4

B. 2

C. 3

D. -4

Answer: A

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54. If A(1,1),B(6,5)C, $\left(\frac{3}{2}, 2\right)$ are vertices of $\triangle ABC$. A point P is such that area of $\triangle PAB$, $\triangle PAC$, $\triangle PBC$ are equal also $Q\left(\frac{-7}{6}, \frac{-1}{3}\right)$ then length of PQ is

A. 2

B. 3

C. 4

D. 5

Answer: D

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Physics

1. A plane electromagnetic wave of frequency $50MHz$ travels in free space along the positive x-direction. At a particular point is space and time, $\overrightarrow{E} = 6.3\hat{j}V/m.$ The corresponding magnetic field $\widehat{B}$, at that point wiil be:

A. $18.9 \times 10^{-8}\hat{k}T$

B. $2.1 \times 10^{-8}\hat{k}T$

C. $6.3 \times 10^{-8}\hat{k}T$

D. $18.9 \times 10^{8}\hat{k}T$

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2. Three charges +Q, q, +Q are placed respectively, at distance, 0, d//2 and d from the origin, on the x-axis. If the net force experienced by +Q placed at x=0, is zero, then value of q is :

A. $-Q/4$

B. $+Q/2$

C. $Q/4$

D. $-Q/2$

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3. A copper wire is stretched to make it 0.5% longer. The percentage change in its electrical resistance if its volume remains unchanged is :

A. 2.0%

B. 2.5%

C. 1.0%

D. 0.5%

4. A sample of radioactive material A, that has an activity of $10 mCi\left(1 Ci = 3.7 \times 10^{10} decays / s\right)$, has twice the number of nuclei as another sample of a different radioactive material B which has an activity of 20 mCi. The correct choices for half-lives of A and B would then be respectively :

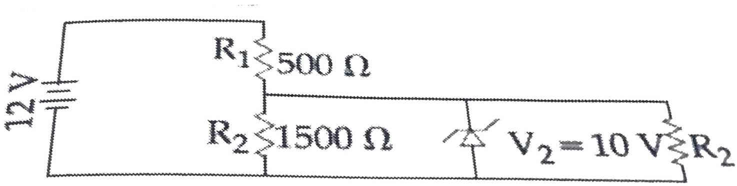
A. 5 days and 10 days

B. 10 days and 40 days

C. 20 days and 5 days

D. 20 days and 10 days

5. In the given circuit the current through Zener Diode is close to :



A. 0.0 mA

B. 6.7 mA

C. 4.0 mA

D. 6.0 mA

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6. There are two long co-axial solenoids of same length l. The inner and other coils have redii r_1 and r_2 and number of turns per unti length n_1 and n_2 respectively .The reatio of mutual inductance to the self - inductance of the inner- coil is : (A) $\frac{n_1}{n_2}$ (B) $\frac{n_2}{n_1} \cdot \frac{r_1}{r_2}$ (C) $\frac{n_2}{n_1} \cdot \frac{r_2^2}{r_1^2}$ (D) $\frac{n_2}{n_1}$

A. $\frac{n_1}{n_2}$

B. $\frac{n_2}{n_1} \cdot \frac{r_1}{r_2}$

C. $\frac{n_2}{n_1} \cdot \frac{r_2^2}{r_1^2}$

D. $\frac{n_2}{n_1}$

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7. If the deBroglie wavelenght of an electron is equal to 10^-3 times the wavelenght of a photon of frequency 6×10^{14}Hz ,then the calculate speed of electrone. Speed of light $= 3 \times 10^8 m/s$

Planck's constant $= 6.63 \times 10^{-34}$ J s

Mass of electron $= 9.1 \times 10^{-31}$ kg

A. $1.1 \times 10^6 m/s$

B. $1.7 \times 10^6 m/s$

C. $1.8 \times 10^6 m/s$

D. $1.45 \times 10^6 m / s$

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8. एक प्रगामी आवर्ती तरंग को समीकरण y(x, y) = 10^{-3} sin(50t + 2x) से निरूपित किया जाता है, जहाँ x तथा y मीटर में तथा 1 सेकण्ड में हैं। निम्न में से तरंग के लिए कौनसा कथन सत्य है|

A. the wave is propagating along the negative x-axis with sped $25ms^{-1}$

B. the wave is propagating along the postitive x-axis with speed $100ms^{-1}$

C. the wave is propagating along the postive x-axis with speed $25ms^{-1}$

D. the wave is propagating along the nagative x-axis with speed $100ms^{-1}$

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9. AN ideal battery of 4 V and resistance R are connected in series in the primary circuit of a notentiometer of length 1 m and the value of R, to give a differeence of 56mV across 10 cm of notentiometer wire , is :

A. 490Ω

B. 480Ω

C. 396Ω

D. 495Ω

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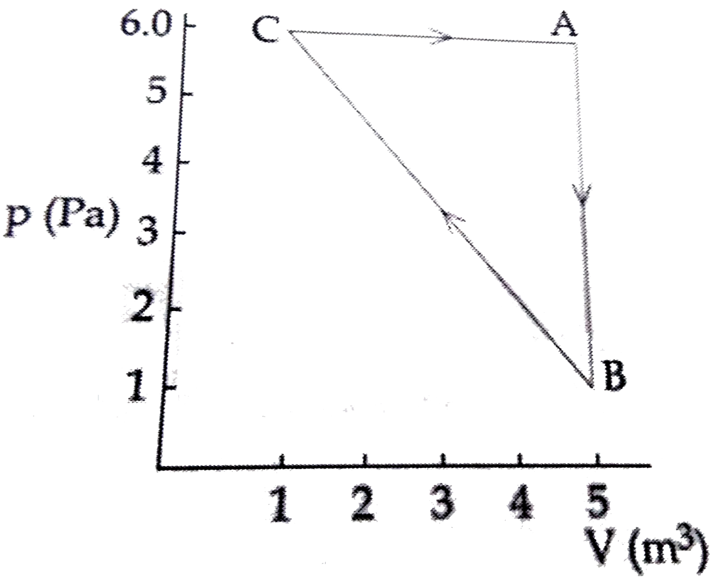
10. for the given cyclic process CAB as shown for a gas , the work done is :



A. 30J

B. 10J

C. 1J

D. 5J

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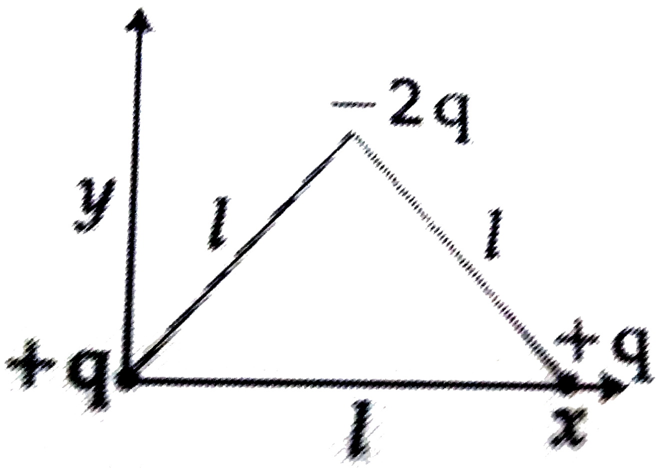
11. Determine the electric dipole moment of the syatem of three charges , placed on the verices of an equilateral triangle , as shown in the fogure :



A. $\sqrt{3}ql\frac{\hat{j}-\hat{i}}{\sqrt{2}}$

B. $(ql)\frac{\hat{i}+\hat{j}}{\sqrt{2}}$

C. $2ql\hat{j}$

D. $-\sqrt{3}ql\hat{j}$

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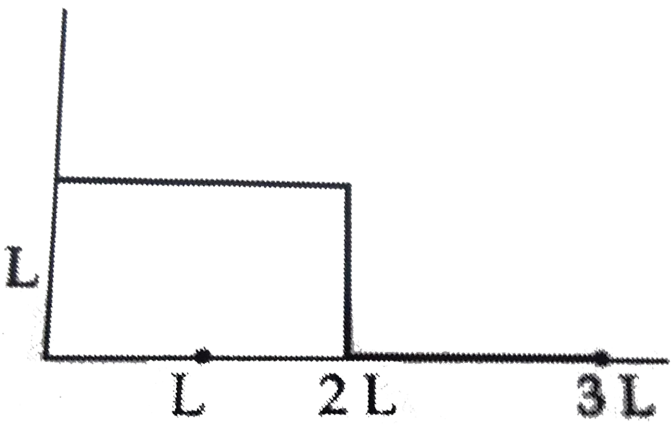
12. the position vector of the centre of mass It

$\rightarrow$

r cm of an asymmetric uniform bar of negligible area of cross - section as

shown in figure is :



A. $\overrightarrow{r}_{cm} = \frac{13}{8}L\widehat{x} + \frac{5}{8}L\widehat{y}$

B. $\overrightarrow{r}_{cm} = \frac{5}{8}L\widehat{x} + \frac{13}{8}L\widehat{y}$

C. $\overrightarrow{r}_{cm} = \frac{3}{8}L\widehat{x} + \frac{11}{8}L\widehat{y}$

D. $\overrightarrow{r}_{cm} = \frac{11}{8}L\widehat{x} + \frac{3}{8}L\widehat{y}$

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13. A person standing on an open ground hears the sound of a jet aeroplane , coming from north at an angle 60° with ground level ,But he finds the aeroplane right vertically above his position , if V is the speed of sound , speed of the plane is :

A. $\frac{\sqrt{3}}{2}v$

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

C. v

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

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14. An ideal gas is enclosed in a cylinder at pressure of 2 atm and temperature, 300 K.The men time between two successive collosions is 6×10^{-8} s. If the pressure to $500K$, the mean time between two successive collisions will be close to :

A. $2 \times 10^{-7} s$

B. $4 \times 10^{-8} s$

C. $0.5 \times 10^{-8} s$

D. $3 \times 10^{-6} s$

Answer: A

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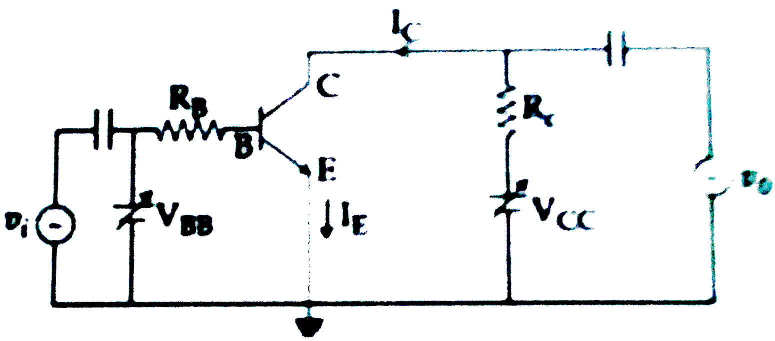
15. 

In the figure, given that V_{BB} supply can vary from 0 to $5.0V$, $V_{\mathbb{C}} = 5V$, $\beta_{dc} = 200$, $R_B = 100K\omega$, $R_C = 1K\omega$ and $V_{BE} = 1.0V$, The minimum base current and the input voltage at which the transistor will go to saturation, will be, respectively:

A. $25\mu A$ and $3.5V$

B. $20\mu A$ and $3.5V$

C. $25\mu A$ and $2.8V$

D. $20\mu A$ and $2.8V$

Answer: A

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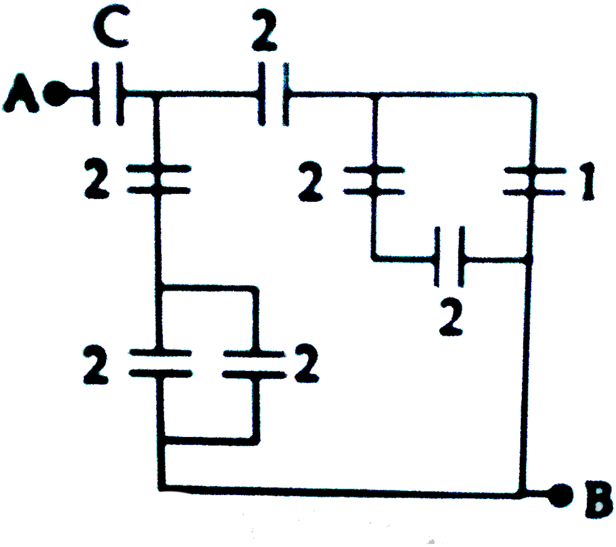
16. In the circuit shown, find C if the effective capacitance of the whole, circuit is to be $0.5\mu F$. All values in the circuit are in μF.



A. $\frac{7}{11}\mu F$

B. $\frac{6}{5}\mu F$

C. $4\mu F$

D. $\frac{7}{10}\mu F$

Answer: A

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17. A 10 m long horizontal wire extends from North east ro South East. It is falling with a speed of $5.0 ms^{-1}$, at right angles to the horizontal component of the earth's magnetic field, of $0.3 \times 10^{-4} Wb/m^2$. The value of the induced emf in wire is :

A. $1.5 \times 10^{-3} V$

B. $1.1 \times 10^{-3} V$

C. $2.5 \times 10^{-3} V$

D. $0.3 \times 10^{-3} V$

Answer: A

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18. To double the covering range of a TV transmittion tower, its height should be multiplied by :

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

B. 2

C. 4

D. $\sqrt{2}$

Answer: A

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MATHEMATICS

1. Let a vector $\overrightarrow{a} = \alpha\hat{i} + 2\hat{j} + \beta\hat{k}\ (\alpha, \beta \in R), \overrightarrow{a}$ lies in the plane of the vectors, $\overrightarrow{b} = \hat{i} + \hat{j}$ and $\overrightarrow{c} = \hat{i} - \hat{j} + 4\hat{k}$. If $\overrightarrow{a}$ bisects the angle between $\overrightarrow{b}$ and $\overrightarrow{c}$, then :

A. (a) $\overrightarrow{a} \cdot \overrightarrow{i} + 3 = 0$

B. (b) $\overrightarrow{a} \cdot \hat{i} + 1 = 0$

C. (c) $\overrightarrow{a} \cdot \hat{k} + 2 = 0$

D. (d) $\overrightarrow{a} \cdot \hat{k} + 4 = 0$

Answer: C

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2.

If $y=\sqrt{\frac{2(\tan\alpha+\cot\alpha)}{1+\tan^2\alpha}+\frac{1}{\sin^2\alpha}}$ when $\alpha\in\left(\frac{3\pi}{4},\pi\right)$ then find $\frac{dy}{d\alpha}$ a

A. (a) $\frac{4}{3}$ (b) 4 (c) -4 (d) $-\frac{1}{4}$

B.

C.

D.

Answer: B

Watch Video Solution

3. Total number of six-digit number in which all and only odd digits appear is a. $\frac{5}{2}(6!)$ b. $6!$ c. $\frac{1}{2}(6!)$ d. none of these

A. 6!

B. $\frac{1}{2}(6!)$

C. 5^6

D. $\frac{5}{2}(6!)$

Answer: D

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4. If sum of 5 consecutive terms of an A.P. is 25 & product of these terms is 2520. If one of the terms is -1/2 then the value of greatest term is.

A. 27

B. 7

C. 16

D. $\frac{21}{2}$

Answer: C

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5. If y=mx+4 is common tangent to parabolas $y^2 = 4x$ and $x^2 = 2by$. Then value of b is

A. (a)128

B. (b)-128

C. (c)-64

D. (d)-32

Answer: B

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6. If α and β are the roots of equation $(k+1)\tan^2 x - \sqrt{2}\lambda \tan(x) = 1 - k$ and $\tan^2(\alpha+\beta) = 50$. Find the value of λ

A. $10\sqrt{2}$

B. $5\sqrt{2}$

C. 10

D. 5

Answer: C

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7. If the system of linear equations

$x + 2ay + az = 0$

$x + 3by + bz = 0$

$x + 4cy + cz = 0$

has a non zero solutions, then a, b, c are in

A. $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in A.P.

B. a, b, c are in A.P.

C. a,b,c are G.P.

D. $a + b + c = 0$

Answer: A

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8. Find the greatest value of k for which $49^k + 1$ is a factor of $1 + 49 + 49^2 \ldots . (49)^{125}$

A. (a)65

B. (b)60

C. (c)32

D. (d)63

Answer: D

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9. Let P be a plane passing through the points (2,1,0) (4,1,1) and (5,0,1) and R be any point (2,1,6) . Then the image of R in the plane P is :

A. (4,3,2)

B. (6,5,2)

C. (3,4,-2)

D. (6,5,-2)

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10. If f(x) is continuous and differentiable in $x \in [-7, 0]$ and $f'(x) \leq 2 \forall x \in [-7, 0]$, also f(-7)=-3 then range of f(-1)+f(0)

A. 1. $(-\infty, 11)$

B. 2. $[-6, 20]$

C. 3. $(-\infty, 20]$

D. 4. $[-3, 11]$

Answer: C

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11. If $f(a+b+1-x)=f(x)$, for all x where a and b are fixed positive real numbers, the $\frac{1}{a+b}\int_a^b x(f(x)+f(x+1)$ dx is equal to :

A. $\int_{a-1}^{b-1} f(x+1)dx$

B. $\int_{a-1}^{b-1} f(x)dx$

C. $\int_{a+1}^{b+1} f(x+1)dx$

D. $\int_a^b f(1+x)dx$

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12. Let y=f(x) is a solution of differential equation $e^y\left(\frac{dy}{dx}-1\right)=e^x$ and f(0)=0 then f(1) is equal to

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13. If z=x+iy and real part $\left(\frac{z-1}{2z+i}\right)=1$ then locus of z is

A. 1. circle whose diameter is $\frac{\sqrt{5}}{2}$

B. 2. straight line whose slope is $\frac{3}{2}$

C. 3. straight line whose slope is $-\frac{2}{3}$

D. 4. circle whose centre is at $\left(-\frac{1}{2},-\frac{3}{2}\right)$.

Answer: A

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14. The area that is enclosed in the circle $x^2+y^2=2$ which is not common enclosed by $y=x \& y^2=x$ is

A. 1. $\frac{1}{3}(12\pi-1)$

B. 2. $\frac{1}{6}(24\pi-1)$

C. 3. $\frac{1}{6}(12\pi-1)$

D. 4. $\frac{1}{3}(6\pi-1)$

Answer: C

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15. If distance between the foci of an ellipse is 6 and distance between its directrices is 12, then length of its latus rectum is : (A)4 (B)$3\sqrt{2}$ (C)9 (D) $2\sqrt{2}$

A. $3\sqrt{2}$

B. $\sqrt{3}$

C. $2\sqrt{3}$

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

Answer: A

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16. $(p \rightarrow q) \wedge (q \rightarrow \ -p)$ is equivalent to

A. 1. q

B. 2. ~q

C. 3. p

D. 4. ~p

Answer: D

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17. If $g(x) = x^2 + x - 1$ and $g(f(x)) = 4x^2 - 10x + 5$ then find $f\left(\frac{5}{4}\right)$

A. 1. $\frac{3}{2}$

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

C. 3. $\frac{1}{2}$

D. 4. $-\frac{1}{2}$

Answer: D

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18. Let α be a root of the equation $x^2 + x + 1 = 0$ and the matrix

$$A = \frac{1}{\sqrt{3}}\begin{bmatrix} 1 & 1 & 1 \\ 1 & \alpha & \alpha^2 \\ 1 & \alpha^2 & \alpha^4 \end{bmatrix}$$

then the matrix A^{31} is equal to :

A. I_3

B. A^2

C. A

D. A^3

Answer: D

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19. Let $x^k + y^k, (a, k > 0)$ and $\frac{dy}{dx} + \left(\frac{y}{x}\right)^{\frac{1}{3}} = 0$ then k is :

A. $\log_e 2$

B. $2e$

C. $1 + \log_e 2$

D. $2 + \log_e 2$

Answer: C

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20. $\lim_{x \to 2} \dfrac{3^x + 3^{3-x} - 12}{3^{-x/2} - 3^{1-x}}$ is equal to ________

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21. Let $A(1, 0)$, $B(6, 2)$ and $C\left(\frac{3}{2}, 6\right)$ be the vertices of a triangle ABC. If P is a point inside the triangle ABC such that the triangles APC, APB and BPC have equal areas , then the length of the line segment PQ, where Q is the point $\left(-\frac{7}{6}, -\frac{1}{3}\right)$, is ________.

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22. If f(x)=|2-|x-3|| is non differentiable in $X \in S$. Then value of $\sum_{x \in S} (f(f(x))$ is

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23. If variance of first n natural number is 10 and variance of first m even natural number is 16 then the value of m+n is

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24. If sum of all the coefficient of even powers in $\left(1 - x + x^2 - x^3 .... x^{2n}\right)\left(1 + x + x^2 .... + x^{2n}\right)$ is 61 then n is equal to

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25. If θ_1 and θ_2 be respectively the smallest and the largest values of θ in $(0, 2\pi) - (\pi)$ which satisfy the equation, $2\cot^2\theta - \frac{5}{\sin\theta} + 4 = 0$, then $\int_{\theta_1}^{\theta_2} \cos^2 3\theta d\theta$ is equal to :

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

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

C. $\frac{\pi}{3} + \frac{1}{6}$

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

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26. Let y(x) is solution of differential equation $\left(y^2 - x\right)\frac{dy}{dx}$ = 1 and y(0) = 1, then find the value of x where curve cuts the x-axis

A. 1. $-e$

B. 2. $2 - e$

C. 3. 2

D. 4. $2 + e$

Answer: B

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27. The value of c in the Lagrange's mean value theorem for the function $f(x) = x^3 - 4x^2 + 8x + 11$, when $x \in [0, 1]$ is :

A. (a) $\frac{\sqrt{7} - 2}{3}$

B. (b) $\frac{4 - \sqrt{5}}{3}$

C. (c) $\frac{4 - \sqrt{7}}{3}$

D. (d) $\frac{2}{3}$

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28. Let 3 + 4 + 8 + 9 + 13 + 14 + 18 +..........40 terms = S. If S = (102)m then m =

A. (a)5

B. (b)20

C. (c)25

D. (d)10

Answer: B

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29. The area bounded by $4x^2 \leq y \leq 8x + 12$ is -

A. 1. $\frac{125}{3}$

B. 2. $\frac{124}{3}$

C. 3. $\frac{128}{3}$

D. 4. $\frac{127}{3}$

Answer: C

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30. Pair of tangents are drawn from origin to the circle $x^2 + y^2 - 8x - 4y + 16 = 0$ then square of length of chord of contact is

A. 1.$\frac{64}{5}$

B. 2.$\frac{52}{5}$

C. 3.$\frac{56}{5}$

D. 4.$\frac{32}{5}$

Answer: A

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31. There are 5 machines. Probability of a machine being faulted is $\frac{1}{4}$. Probability of atmost two machines is faulted, is $\left(\frac{3}{4}\right)^3 k$, then value of k is

A. 1. $\frac{17}{2}$

B. 2. $\frac{17}{8}$

C. 3. 4

D. 4. $\frac{17}{4}$

Answer: B

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32. Let A, B, C and D be four non-empty sets. The contrapositive statement of "If $A \subseteq B$ and $B \subseteq D$, then $A \subseteq C$" is :

A. 1.If $A \not\subseteq C$, then $A \not\subseteq B$ or $B \not\subseteq D$

B. 2.If $A \not\subseteq C$, then $A \not\subseteq B$ and $B \not\subseteq D$

C. 3.If $A \subseteq C$, then $B \subset A$ or $D \subset B$

D. 4.If $A \not\subseteq C$, then $A \subset B$ and $B \subseteq D$

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33. Let f(x) be a polynomial of degree 5 such that $x = \pm 1$ are its critical points. If $\lim_{x \to 0} \left(2 + \frac{f(x)}{x^3}\right) = 4$, then which one of the following is true?

A. 1. x = 1 is a point of minima and x = - 1 is a point of maxima of f

B. 2. f is an odd function

C. 3. f(1) - 4f(-1) = 4

D. 4. x = 1 is a point of maxima and x = - 1 is a point of minimum of f

Answer: D

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34. If $.^{36}C_{r+1} \times (k^2 - 3) = 6 \times .^{35}C_r$, then number of ordered pairs (r, k) are (where $k \in I$).

A. 1. 4

B. 2. 6

C. 3. 2

D. 4. 3

Answer: A

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35. If $\vec{a}, \vec{b}, \vec{c}$ are unit vectors such that $\vec{a}+\vec{b}+\vec{c}=0$ and $\lambda=\vec{a}.\vec{b}+\vec{b}.\vec{c}+\vec{c}.\vec{a}$ and $d=\vec{a}\times\vec{b}+\vec{b}\times\vec{c}+\vec{c}\times\vec{a}$, then $\left(\lambda, \vec{d}\right)$ is

A. $\left(-\frac{3}{2}, 3\vec{c}\times\vec{b}\right)$

B. $\left(\frac{3}{2}, 3\vec{a}\times\vec{c}\right)$

C. $\left(\frac{3}{2}, 3\vec{b}\times\vec{c}\right)$

D. $\left(-\frac{3}{2}, 3\vec{a}\times\vec{b}\right)$

Answer: D

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36. If z = $\frac{3+i\sin\theta}{4-i\cos\theta}$ is purely real and $\theta \in \left(\frac{\pi}{2}, \pi\right)$,then $arg(\sin\theta + i\cos\theta)$ is -

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

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

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

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

Answer: B

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37. $3x + 4y = 12\sqrt{2}$ is the tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{9} = 1$ then the distance between focii of ellipse is-

A. 1. $2\sqrt{7}$

B. 2. 4

C. 3. $2\sqrt{5}$

D. 4. $2\sqrt{2}$

Answer: A

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38. The value of α for which $4\alpha\int_{-1}^{2} e^{-\alpha|x|}dx = 5$ is :

A. 1. $\log_e 2$

B. 2. $\log_e\left(\frac{3}{2}\right)$

C. 3. $\log_e\left(\frac{4}{3}\right)$

D. 4. $\log_e \sqrt{2}$

Answer: A

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39. Let α and β are the roots of $x^2 - x - 1 = 0$ such that $P_k = \alpha^k + \beta^k, k \geq 1$ then which one is incorrect?

A. $(p_1 + p_2 + p_3 + p_4 + p_5) = 26$

B. $p_3 = p_5 - p_4$

C. $p_5 = 11$

D. $p_5 = p_2 . P_3$

Answer: D

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40. Let $A = [a_{ij}], B = [b_{ij}]$ are two 3 × 3 matrices such that $b_{ij} = \lambda^{i+j-2} a_{ij}$ & $|B| = 81$. Find |A| if λ = 3.

A. $1/81$

B. $1/9$

C. 3

D. $1/3$

Answer: B

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41. From any point P on the line x = 2y perpendicular is drawn on y = x. Let foot of perpendicular is Q. Find the locus of mid point of PQ.

A. 5x - 7y = 0

B. 2x - 3y = 0

C. 3x - 2y = 0

D. 7x - 5y = 0

Answer: A

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42. Let $a_1, a_2, a_3, \ldots$ be a G. P. such that $a_1 < 0$, $a_1 + a_2 = 4$ and $a_3 + a_4 = 16$. If $\sum_{i=1}^{9} a_i = 4\lambda$, then λ is equal to :

A. $\frac{511}{3}$

B. 171

C. -513

D. -171

Answer: D

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43. if $y\sqrt{1-x^2} = k - x\sqrt{1-y^2}$ and $y\left(\frac{1}{2}\right) = -\frac{1}{4}$, then $\frac{dy}{dx}$ at x = $\frac{1}{2}$

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

B. $-\frac{\sqrt{5}}{2}$

C. $\frac{2}{\sqrt{5}}$

D. $-\frac{\sqrt{5}}{4}$

Answer: B

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44. Coefficient of x^7 in $(1+x)^{10} + x(1+x)^9 + x^2(1+x)^8 + \ldots\ldots\ldots\ldots + x^{10}$ is

A. 210

B. 330

C. 420

D. 120

Answer: B

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45. If $Q\left(\frac{5}{3}, \frac{7}{3}, 17, 3\right)$ is foot of perpendicular drawn from $P(1, 0, 3)$ on a line L and if line L is passing through $(\alpha, 7, 1)$, then value of α is

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46. If system of equation

x + y + z = 6

x + 2y + 3z = 10

3x + 2y + λz = μ has more than two solutions. Find $(\mu - \lambda)$

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47. If the mean and variance of eight numbers 3, 7, 9, 12, 13, 20, x and y be 10 and 25 respectively, then x.y is equal to ______.

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48. Let X = {x : 1 le x le 50, x in N} A = {x: x is multiple of 2} B = {x: x is multiple of 7} Then find number of elements in the smallest subset of X which contain elements of both A and B

Watch Video Solution

49. If F(x) is defined in $x \in \left(-\frac{1}{3}, \frac{1}{3}\right)$

f(x) = {((1/x)log_e((1+3x)/(1-2x)),x !=0),(k,x=0):}

zfind k such that f(x) is continuous

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50. Let ABC is a triangle whose vertices are $A(1, -1), B(0, 2), C(x', y')$ and area of $\triangle ABC$ is 5 and C(x', y') lie on $3x + y - 4\lambda = 0$, then

A. -3

B. 1

C. 4

D. 3

Answer: D

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51. Let $P(A)=\frac{1}{3}$, $P(B)=\frac{1}{6}$ where A and B are independent events then

A. $P(A/B)=\frac{2}{3}$

B. $P(A/B')=\frac{1}{3}$

C. $P(A'/B')=\frac{1}{3}$

D. $P(A/A\cup B)=\frac{1}{4}$

Answer: B

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52. Let $f(x)=\left\{\left(\sin\left(\tan^{-1}x\right)+\sin\left(\cot^{-1}x\right)\right\}^2-1, \text{ where } |x|>1$ and $\frac{dy}{dx}=\frac{1}{2}\frac{d}{dx}\left(\sin^{-1}f(x)\right)$. If $y\left(\sqrt{3}\right)=\frac{\pi}{6}$ then $y\left(-\sqrt{3}\right)$

A. $-\frac{\pi}{6}$

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

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

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

Answer: A

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53. $f(x)=\frac{8^{2x}-8^{-2x}}{8^{2x}+8^{-2x}}$ find the inverse of the function

A. $\frac{1}{4}\left(\log_g e\right)\log_e\left(\frac{1+x}{1-x}\right)$

B. $\frac{1}{4}\left(\log_g e\right)\log_e\left(\frac{1-x}{1+x}\right)$

C. $\frac{1}{4}\log_e\left(\frac{1-x}{1+x}\right)$

D. $\frac{1}{4}\log_8\left(\frac{1+x}{1-x}\right)$

Answer: D

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54. The system of equation

$3x + 4y + 5z = \mu$

$x + 2y + 3z = 1$

$4x + 4y + 4z = \delta$ is inconsistent, then (δ, μ) can be

A. (4,3)

B. (4,6)

C. (3,4)

D. (1,0)

Answer: 3

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55. If $y^2 = ax$ and $x^2 = ay$ intersect at A & B. Area bounded by both curves is bisected by line x = b(given $a > b > 0$). Area of triangle formed by line AB, x = b and x-axis is $\frac{1}{2}$. Then

A. $x^6 - 12x^3 - 4 = 0$

B. $x^6 - 6x^3 + 4 = 0$

C. $x^6 - 12x^3 + 4 = 0$

D. $x^6 + 6x^3 - 4 = 0$

Answer: c

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56. Let $F: R \to R$ be such that F for all $x \in R$ $(2^{1+x} + 2^{1-x}), F(x)$ and $(3^x + 3^{-x})$ are in A.P., then the minimum value of F(x) is:

A. 4

B. 0

C. 2

D. 3

Answer: D

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57. Consider a function $f(x) = \ln\left(\frac{x^2+\alpha}{7x}\right)$. If for the given function, Rolle's theorem is applicable in $[3, 4]$ at a point C then find $f''(C)$

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

B. $-\frac{1}{12}$

C. $\frac{\sqrt{3}}{7}$

D. $-\frac{1}{24}$

Answer: A

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58. Let $f(x) = x\cos^{-1}(-\sin|x|), x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

A. FIGURE is decreasing iin $\left(-\frac{\pi}{2}, 0\right)$ and increasing in $\left(0, \frac{\pi}{2}\right)$

B. FIGURE' is incresing in $\left(-\frac{\pi}{2}, 0\right)$ and decreasing in $\left(0, \frac{\pi}{2}\right)$

C. FIGURE is not diFIGUREFIGUREerentiable at x=0

D. FIGURE'(0)=$-\frac{\pi}{2}$

Answer: A

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59. Let the line $y = mx$ and the ellipse $2x^2 + y^2 = 1$ intersect at a point P in the first quadrant. If the normal to this ellipse at P meets the co - ordinate axes at $\left(-\frac{1}{3\sqrt{2}}, 0\right)$ and $(0, \beta)$, then β is equal to

A. $\frac{2\sqrt{2}}{3}$

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

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

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

Answer: C

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60. The shortest distance between the lines $\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1}$ and $\frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$ is

A. 3

B. $3\sqrt{30}$

C. $\frac{7}{2}\sqrt{30}$

D. $2\sqrt{30}$

Answer: B

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61. Which of the following is tautology

A. $P \wedge (p \vee Q)$

B. $P \vee (P \wedge Q)$

C. $Q \to (P \wedge (P \to Q))$

D. $(P \wedge (P \to Q)) \to Q$

Answer: D

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62. Let P be a point on $x^2 = 4y$. The segment joining $A(0, -1)$ and P is divided by point Q in the ratio 1:2, then locus of point Q is

A. $4x^2 - 3y = 2$

B. $9x^2 - 3y = 2$

C. $x^2 - 3y = 2$

D. $9x^2 - 12y = 8$

Answer: D

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63. Mean and standard deviations of 10 observations are 20 and 2 respectively. If p $(p \neq 0)$ is multiplied to each observation and then q $(q \neq 0)$ is subtracted then new mean and standard deviation becomes half of original value . Then find q

A. 10

B. -10

C. -20

D. 5

Answer: C

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64. If volume of parallelopiped whose there coterminous edges are $\overrightarrow{u}=\hat{i}+\hat{j}+\lambda\hat{k}, \overrightarrow{v}=2\hat{i}+\hat{j}+\hat{k}, \overrightarrow{w}=\hat{i}+\hat{j}+3\hat{k},$ is 1 cubic unit then cosine of angle between $\overrightarrow{u}$ and $\overrightarrow{v}$ is

A. $\frac{7}{6\sqrt{6}}$

B. $\frac{5}{7}$

C. $\frac{7}{6\sqrt{3}}$

D. $\frac{5}{3\sqrt{3}}$

Answer: c

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65. Let $\int \frac{\cos x dx}{(\sin^3 x)(1+\sin^6 x)^{\frac{2}{3}}} = f(x)(1+\sin^6 x)^{\frac{1}{\lambda}} + C$ then find the value of $\lambda f\left(\frac{\pi}{3}\right)$

A. $\frac{9}{8}$

B. -2

C. $-\frac{9}{8}$

D. 2

Answer: B

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66. Roots of the equation $x^2+bx+45=0, b \in R$ lie on the curve |z + 1| = 2sqrt(10), where z is a complex number then

A. $b^2+b=12$

B. $b^2+b=72$

C. $b^2-b=30$

D. $b^2-b=42$

Answer: c

Watch Video Solution

67. If $y(x)$ is a solution of differential equation $\sqrt{1-x^2}\frac{dy}{dx}+\sqrt{1-y^2}=0$ such that $y\left(\frac{1}{2}\right)=\frac{\sqrt{3}}{2}$, then

A. $-\frac{\sqrt{3}}{2}$

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

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

D. $\frac{1}{\sqrt{2}}$

Answer: D

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68. $\lim_{x\to 0}\left(\frac{3x^2+2}{7x^2+2}\right)^{\frac{1}{x^2}}$ is equal to

A. e^2

B. e

C. $\frac{1}{e^2}$

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

Answer: C

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69. If maximum value of $.^{19}C_p is a, .^{20}C_q is b, .^{21}C_r is c$, then relation between a, b, c is

A. $\frac{a}{11}=\frac{b}{22}=\frac{c}{42}$

B. $\frac{a}{11}=\frac{b}{22}=\frac{c}{21}$

C. $\frac{a}{10}=\frac{b}{11}=\frac{c}{21}$

D. $\frac{a}{10}=\frac{b}{11}=\frac{c}{42}$

Answer: A

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70. An urn contains 5 red marbels,4 black marbels and 3 white marbles. Then the number of ways in which 4 marbles can be drawn so that at most three of them are red is ________

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71. Find the sum, $\sum_{k=1}^{20}(1+2+3+\ldots..+k)$

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72. A is a 3×3 matrix whose elements are from the set $\{-1,0,1\}$. Find the number of matrices A such that $tr(A\times A^T)=3$. Where $tr(A)$ is the trace of A.

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73. If normal at P on the curve $y^2-3x^2+y+10=0$ passes through the point $\left(0,\frac{3}{2}\right)$,then slope of tangent at P is n. The value of |n| is equal to

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74. The equation $2x^2 + (a - 10)x + \frac{33}{2} = 2a$ has real roots. Find least positive value of a.

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75. Value of $\cos^3\left(\frac{\pi}{8}\right)\cos^3\left(\frac{3\pi}{8}\right) + \sin^3\left(\frac{\pi}{8}\right)\sin^3\left(\frac{3\pi}{8}\right)$ is

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

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

C. $\frac{1}{8\sqrt{2}}$

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

Answer: C

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76. The negation of '$\sqrt{5}$ is an integer or 5 is an irrational number' is

A. $\sqrt{5}$ is not an interger and 5 is not irrational.

B. $\sqrt{5}$ is an interger and 5 irrational.

C. $\sqrt{5}$ is not an integer or 5 is not irrational.

D. $\sqrt{5}$ is irrational or 5 is an interger.

Answer: A

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77. Find the integration $\int \frac{dx}{(x-3)^{\frac{6}{7}}(x+4)^{\frac{8}{7}}}$

A. $\left(\frac{x-3}{x+4}\right)^{\frac{1}{7}} + C$

B. $-\left(\frac{x-3}{x+4}\right)^{\frac{1}{7}} + C$

C. $\frac{1}{2}\left(\frac{x-3}{x+4}\right)^{\frac{3}{7}} + C$

D. $-\frac{1}{13}\left(\frac{x-3}{x+4}\right)^{\frac{-13}{7}} + C$

Answer: A

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78. A sphere of 10cm radius has a uniform thickness of ice around it. Ice is melting at rate $50cm^3 / \min$ when thickness is 5cm then rate of change of thickness

A. $\frac{5}{6\pi}$

B. $\frac{1}{36\pi}$

C. $\frac{1}{18\pi}$

D. $\frac{1}{54\pi}$

Answer: C

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79. Let C be the centroid of the triangle with vertices (3, -1) (1, 3) and (2, 4). Let P be the point of intersection of the lines $x + 3y - 1 = 0$ and $3x - y + 1 = 0$. Then the line passing through the points C and P also passes through the point :

A. $(-9, -6)$

B. $(7, 6)$

C. $(9, 7)$

D. $(-9, -7)$

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80. In a bag there are 20 cards 10 names A and another 10 names B. Cards are drawn randomly one by one with replacement then find probability that second A comes before third B

A. $\frac{15}{16}$

B. $\frac{11}{16}$

C. $\frac{9}{16}$

D. $\frac{13}{16}$

Answer: B

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81. F(x) =

$$\left\{\left(\frac{\sin(a+2)x+\sin x}{x}, x<0\right), (b, x=0), \left(\frac{\left(x+3x^2\right)^{\frac{1}{3}}-x^{\frac{1}{3}}}{x^{\frac{4}{3}}}\right), x>0\right.$$

Function is continuous at x = 0, find $a+2b$.

A. -1

B. 0

C. 1

D. -2

Answer: B

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82. If $A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 3 & 4 \\ 1 & -1 & 3 \end{bmatrix}$, $B = adj(A)$ and $C = 3A$ then $\frac{|adj(B)|}{|C|}$ is

A. 2

B. 16

C. 8

D. 72

Answer: C

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83. If number of 5 digit numbers which can be formed without repeating any digit while tenth place of all of the numbers must be 2 is 336 k find value of k

A. 7

B. 8

C. 6

D. 4

Answer: B

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84. If plane $x + 4y - 2z = 1, x + 7y - 5z = \beta, x + 5y + \alpha z = 5$ intersects in a line $(R \times R \times R)$ then $\alpha + \beta$ is equal to

A. 2

B. 10

C. 0

D. -10

Answer: B

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85. about to only mathematics

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

B. 2

C. 1

D. $2^{\frac{1}{2}}$

Answer: A

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86. If $\left|\frac{z-i}{z+2i}\right| = 1, |z| = \frac{5}{2}$ then the value of $|z+3i|$

A. $\frac{15}{4}$

B. $2\sqrt{3}$

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

D. $\sqrt{10}$

Answer: C

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87. Let the observations $x_i(1 \leq I \leq 10)$ satisfy the equations, $\Sigma_{i=1}^{10}(x_i - 5) = 10$ and $\Sigma_{i=1}^{10}(x_i - 5)^2 = 40$. If μ and λ are the mean and the variance of the observations, $x_1 - 3, x_2 - 3, \ldots, -3,$ then the ordered pair (μ, λ) is equal to :

A. $(3, 3)$

B. $(6, 3)$

C. $(6, 6)$

D. $(3, 6)$

Answer: A

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88. If $f'(x) = \tan^{-1}(\sec x + \tan x), x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ and $f(0) = 0$ then the value of $f(1)$ is

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

B. $\frac{\pi - 1}{4}$

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

D. $\frac{\pi + 2}{4}$

Answer: D

Watch Video Solution

89. If e_1 and e_2 are eccentricities of $\frac{x^2}{18} + \frac{y^2}{4} = 1$ and $\frac{x^2}{9} - \frac{y^2}{4} = 1$ respectively and if the point (e_1, e_2) lies on ellipse $15x^2 + 3y^2 = k$. Then the value of k

A. 15

B. 14

C. 16

D. 17

Answer: 16

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90. Find number of real roots of equation $e^{4x} + e^{3x} - 4e^{2x} + e^{x} + 1 = 0$ is

A. 2

B. 3

C. 4

D. 1

Answer: 4

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91. If $f(x) = a + bx + cx^2$ where $a, b, c \in R$ then $\int_o^1 f(x)dx$

A. $\frac{1}{3}\left\{f(0) + f(1) + 2f\left(\frac{1}{2}\right)\right\}$

B. $\frac{1}{6}\left\{f(0) + f(1) + 4f\left(\frac{1}{2}\right)\right\}$

C. $\frac{1}{6}\left\{f(0) + f(1) - 4f\left(\frac{1}{2}\right)\right\}$

D. $\frac{1}{6}\left\{f(0) - f(1) - 4f\left(\frac{1}{2}\right)\right\}$

Answer: 2

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92. If $\overrightarrow{P} = (a+1)\hat{i} + a\hat{j} + a\hat{k}$

$\overrightarrow{Q} = a\hat{i} + (a+1)\hat{j} + a\hat{k}$

$\overrightarrow{R} = a\hat{i} + a\hat{j} + (a+1)\hat{k}$

$\overrightarrow{P}, \overrightarrow{Q}, \overrightarrow{R}$ are coplanar vectors and $3\left(\overrightarrow{P}.\overrightarrow{Q}\right)^2 - \lambda\left|\overrightarrow{R} \times \overrightarrow{Q}\right|^2 = 0$ then

value of lambda is

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93. Find the coefficient of x^4 in $\left(1+x+x^2\right)^{10}$

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94. Find the number of solution of

$\log_{\frac{1}{2}}|\sin x| = 2 - \log_{\frac{1}{2}}|\cos x|, x \in [0, 2\pi]$

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95. If for $x \geq 0, y = (x)$ is the solution of the differential equation,

$(x+1)dy = \left((x+1)^2 + y - 3\right)dx, y(2) = 0,$

then y(3) is equal to ....

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96. The projection of the line segment joining the points $(1, -1, 3)$ and

$(2, -4, 11)$ on the line joining the points $(-1, 2, 3)$ and $(3, -2, 10)$, is ......

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97. If $7x+6y-2z=0, 3x+4y+2z=0, x-2y-6z=0$ then which option is correct

A. infinitely many solutions (x,y,z) satisfying y=2z

B. no solution

C. only the trivial solution

D. infinitely many solutions (x,y,z) satisfying x=2z

Answer: D

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98. if $f(x)$ and $g(x)$ are continuous functions, fog is identity function, $g'(b)=5$ and $g(b)=a$ then $f'(a)$ is

A. $\frac{1}{5}$

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

C. 1

D. 5

Answer: A

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99. Let $x = 2\sin\theta - \sin 2\theta$ and $y = 2\cos\theta - \cos 2\theta$ find $\frac{d^2y}{dx^2}$ at $\theta = \pi$

A. $-\frac{3}{8}$

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

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

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

Answer: A

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100. If $\frac{dx}{dy} = \frac{xy}{x^2+y^2}$, $y(1) = 1$ and $y(x) = e$ then $x =$

A. $\frac{e}{\sqrt{2}}$

B. $\frac{1}{2}\sqrt{3}e$

C. $\sqrt{2}e$

D. $\sqrt{3}e$

Answer: D

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101. If minimum value of term free from $\times$ for $\left(\frac{x}{\sin\theta} + \frac{1}{(x\cos\theta)^{16}}\right)$ is L_1 in $\left[\frac{\pi}{8}, \frac{\pi}{4}\right]$ and L_2 in $\left[\frac{\pi}{16}, \frac{\pi}{8}\right]$, then $\frac{L_2}{L_1}$

A. $16:1$

B. $1:8$

C. $1:16$

D. $8:1$

Answer: A

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102. Let $x=\sum_{n=0}^{\infty}(-1)^n(\tan\theta)^{2n}$ and $y=\sum_{n=0}^{\infty}(\cos\theta)^{2n}$ qhere $\theta\in\left(0,\frac{\pi}{4}\right)$, then

A. x(1+y) =1

B. x(1 -y) =1

C. y(1-x)=1

D. y(1+x)=1

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103. $\int \left(\frac{d(\theta)}{(\cos^2\theta)(\sec(2\theta)+\tan(2\theta))} \right) = \lambda \tan\theta + 2\log f(x) + c,$ then ordered pair $(\lambda, f(x))$ is

A. $(-1, 1-\tan\theta)$

B. $(1, 1-\tan\theta)$

C. $(-1, 1+\tan\theta)$

D. $(1, 1+\tan\theta)$

Answer: C

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104. Let probability distribution is $\begin{bmatrix} x_i & : & 1 & 2 & 3 & 4 & 5 \\ p_i & : & k^2 & 2k & k & 2k & 5k^2 \end{bmatrix}$ then value of $p(x > 2)$ is

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

B. $\frac{7}{12}$

C. $\frac{1}{36}$

D. $\frac{23}{36}$

Answer: D

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105. If $f(x)=\begin{vmatrix} x+a & x+2 & x+1 \\ x+b & x+3 & x+2 \\ x+c & x+4 & x+3 \end{vmatrix}$ and $a-2b+c=1$ then

A. f(50)=1

B. f(-50)=501

C. f(50)=-501

D. f(-50)=-1

Answer: A

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106. z is a complex number such that $|Re(z)| + |Im(z)| = 4$ then $|z|$ can't be

A. $\sqrt{\frac{17}{2}}$

B. $\sqrt{10}$

C. $\sqrt{8}$

D. $\sqrt{7}$

Answer: D

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107. Let a_n be the n^{th} term, of a G.P of postive terms. If $\Sigma_{n=1}^{100} a_{2n+1} = 200$ and

$\Sigma_{n=1}^{100} a_{2n} = 100, \quad \text{then} \Sigma_{n=1}^{200} a_n$

A. 150

B. 225

C. 300

D. 175

Answer: A

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108. If $\lim_{x \to 0} x\left[\frac{4}{x}\right] = A$, then the value of x at which $f(x) = [x^2]\sin \pi x$ is discontinuous , (where $[.]$ denotes greatest integer function)

A. $\sqrt{A+1}$

B. $\sqrt{A+5}$

C. $\sqrt{A}$

D. $\sqrt{A+21}$

Answer: A

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109. Let one end of focal chord of parabola $y^2 = 8x$ is (1/2, -2)`, then equation of tangent at other end of this focal chord is

A. x+2y+8=0

B. x-2y+8 =0

C. 2x-y-24=0

D. 2x+y-24=0

Answer: B

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110. If 10 different balls are to be placed in 4 distinct boxes at random, then the parobability that two of these boxes contain exactly 2 and 3 balls is :

A. $\frac{945}{2^{11}}$

B. $\frac{945}{2^{10}}$

C. $\frac{965}{2^{11}}$

D. $\frac{965}{2^{10}}$

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111. If $p \to (p \wedge \sim q)$ is false. Truth value of p & q will be

A. F,F

B. T,F

C. F,T

D. T,T

Answer: D

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112. Let $A = \{x : |x| < 2\}$ and $B = \{x : |x - 2| \geq 3\}$ then

A. $B - A = R - (- 2, 5)$

B. $A - B = [- 1, 2)$

C. $A \cap B = R - (2.5)$

D. $A \cap B = (- 2, \ - 1)$

Answer: A

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113. Let $x + 6y = 8$ is tangent to standard ellipse where minor axis is $\frac{4}{\sqrt{3}}$, then eccentricity of ellipse is

A. $\frac{1}{2}\sqrt{\frac{11}{3}}$

B. $\sqrt{\frac{5}{6}}$

C. $\frac{1}{3}\sqrt{\frac{11}{3}}$

D. $\frac{1}{2}\sqrt{\frac{5}{3}}$

Answer: A

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114. Let a function f: $[0, 5] \rightarrow R$ be continuous , f(1) =3 and F be definded as : $F(x) = \int_1^x t^2 g(t)dt,$ where $g(t) = \int_1^t f(u)du.$

Then for the function F, the point x=1 is

A. a point of local minima ,

B. not a critical point.

C. a point of indflection.

D. a point of local maxima

Answer: A

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115. Let both root of equation $ax^2 - 2bx + 5 = 0$ are α and root of equation $x^2 - 2bx - 10 = 0$ are α and β . Find the value of α^2 + β^2

A. 24

B. 28

C. 26

D. 25

Answer: D

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116. If $f(x) = \left\{x, 0 < x < \frac{1}{2}, \frac{1}{2}, x = \frac{1}{2}, 1 - x, \frac{1}{2} < x < 1\right\}$ and $g(x) = \left(x - \frac{1}{2}\right)^2$ then find the area bounded by f(x) and g(x) from $x = \frac{1}{2}$ to $x = \frac{\sqrt{3}}{2}$

A. $\frac{1}{3} + \frac{\sqrt{3}}{4}$

B. $\frac{1}{2} + \left(\frac{\sqrt{3}}{4}\right)$

C. $\frac{\sqrt{3}}{4} - \frac{1}{3}$

D. $\frac{1}{2} - \frac{\sqrt{3}}{4}$

Answer: C

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117. If the distance between the plane 23x-10y-2z+48 =0 and the plane containing the lines

$\frac{x+1}{2}=\frac{y-3}{4}=\frac{z+1}{3}$ and $\frac{x+3}{2}=\frac{y+2}{6}=\frac{z-1}{\lambda}(\lambda \in R)$ is equal to $\frac{k}{\sqrt{633}}$, then k is equal to ___________.

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118. Let $\vec{a}$, $\vec{b}$ and $\vec{c}$ be three vectors such that $\left|\vec{a}\right|=\sqrt{3}$, $\left|\vec{b}\right|=5$, $\vec{b}.\vec{c}=10$ and the angle between $\vec{b}$ and $\vec{c}$ is $\frac{\pi}{3}$, if $\vec{a}$ is perpendicular to the vector $\vec{b}\times\vec{c}$, then $\left|\vec{a}\times\left(\vec{b}\times\vec{c}\right)\right|$ is equal to

___________.

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119. If $.^{25}C_0 + 5.^{25}C_1 + 9.^{25}C_2 \ldots .\ 101.^{25}C_{25} = 2^{25}k$ find k = ?

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120. Find the number of terms common to the two A.P. s : $3, 7, 11, 407 and 2, 9, 16, , 709.$

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121. If the curves $x^2 - 6x + y^2 + 8 = 0$ and $x^2 - 8y + y^2 + 16 - k = 0, (k > 0)$ touch each other at a point , then the largest value of k is ______.

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MATH

1. Let the set of all function $f: [0, 1] \to R,$ which are continuous on $[0, 1]$ and differentiable on $(0, 1)$. Then for every f in S, there exists a c $\in (0, 1)$ depending on f, such that :

A. $|f(c) - f(1)| < (1 - c)|f'(c)|$

B. $\dfrac{f(1) - f(c)}{1 - c} = f'(c)$

C. $|f(c) - f(1)| < |f'(c)|$

D. $|f(c) + f(1)| < (1 + c)|f'(c)|$

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2. If a hyperbola has vertices $(\pm 6, 0)$ and P(10, 16) lies on it, then the equation of normal at P is

A. $3x + 4y = 94$

B. $x + 2y = 42$

C. $2x + 5y = 100$

D. $x + 3y = 58$

Answer: C

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3. It the 10^{th} term of an A. P. is $\frac{1}{20}$ and its 20^{th} term is $\frac{1}{10}$, then the sum of its first 200 terms is :

A. 50

B. $100\frac{1}{2}$

C. 100

D. $50\frac{1}{4}$

Answer: B

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4. Let A=[[2,2],[9,4]] and I=[[1,0],[0,1]]$thenvalueof$10 A^(-1)` is-

A. $6I - A$

B. $A - 4I$

C. $A - 6I$

D. $4I - A$

Answer: C

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5. Let $\alpha = \dfrac{-1 + i\sqrt{3}}{2}$ and $a = (1 + \alpha)\sum_{k=0}^{100} \alpha^{2k}, b = \sum_{k=0}^{100} \alpha^{3k}$. If a and b are roots of quadratic equation then quadratic equation is

A. $X^2 - 102X + 101 = 0$

B. $X^2 + 102X + 101 = 0$

C. $X^2 + 101 + 100 = 0$

D. $X^2 = 101X + 100 = 0$

Answer: A

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6. $\lambda x + 2y + 2z = 5, 2\lambda x + 3y + 5z = 8, 4x + \lambda y + 6z = 10$ for the system of equation check the correct option.

A. no solution when $\lambda = 8$

B. no solution when $\lambda = 2$

C. a unique solution when $\lambda = -8$

D. infinitley many solutions when $\lambda = 2$

Answer: B

Watch Video Solution

7. Let $\vec{a} = \hat{i} - 2\hat{j} + \hat{k}$ and $\vec{b} = \hat{i} - \hat{j} + \hat{k}$ be two vectors. If $\vec{c}$ is a vector such that $\vec{b} \times \vec{c} = \vec{b} \times \vec{a}$ and $\vec{c} \cdot \vec{a} = 0$, theat $\vec{c} \cdot \vec{b}$ is

equal to:

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

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

C. -1

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

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8. Let $f(x) = \frac{x[x]}{x^2+1} : (1, 3) \rightarrow R$ then range of f(x) is (where [.] denotes greatest integer function

A. $\left(\frac{3}{5}, \frac{4}{5}\right)$

B. $\left(\frac{2}{5}, \frac{3}{5}\right] \cup \left(\frac{3}{4}, \frac{4}{5}\right)$

C. $\left(\frac{2}{5}, \frac{1}{2}\right) \cup \left(\frac{3}{5}, \frac{4}{5}\right]$

D. $\left(\frac{2}{5}, \frac{4}{5}\right]$

Answer: C

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9. $\lim_{x \to 0} \frac{\int_0^x t \sin(10t) dt}{x}$ is equal to

A. $-\frac{1}{5}$

B. $-\frac{1}{10}$

C. 0

D. $\frac{1}{10}$

Answer: C

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10. Normal at $(2, 2)$ to curve $x^2 + 2xy - 3y^2 = 0$ is L. Then perpendicular distance from origin to line L is

A. $2\sqrt{2}$

B. 2

C. $4\sqrt{2}$

D. $\sqrt{2}$

Answer: A

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11. Let A and B two events such that the probability that exactly one of them occurs is $\frac{2}{5}$ and the probability that A or B occurs is $\frac{1}{2}$, then probability of both of them occur together is :

A. 0.02

B. 0.10

C. 0.01

D. 0.20

Answer: B

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12. The differential equation of the family of curves, $x^2 = 4b(y + b), b \in R,$ is :

A. $x(y')^2 = x + 2yy'$

B. $x(y')^2 = 2yy' - x$

C. $x(y')^2 = x - 2yy'$

D. `xy''=y'

Answer: A

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13. Let P be the set of points (x, y) such that $x^2 \leq y \leq -2x + 3$. Then area of region bounded by points in set P is

A. $\frac{29}{3}$

B. $\frac{34}{3}$

C. $\frac{32}{3}$

D. $\frac{31}{3}$

Answer: C

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14. Image of $(1, 2, 3)$ w.r.t a plane is $\left(-\frac{7}{3}, -\frac{4}{3}, -\frac{1}{3}\right)$ then which of the following points lie on the plane

A. $(-1, -1, 1)$

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

C. $(1, 1, 1)$

D. $(-1, -1, -1)$

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15. Mean and variance of 20 observation are 10 and 4. It was found, that in place of 11, 9 was taken by mistake find correct variance.

A. 4.02

B. 3.99

C. 3.98

D. 4.01

Answer: B

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16. Let coefficient of x^4 and x^2 in the expansion of $\left(x+\sqrt{x^2-1}\right)^6+\left(x-\sqrt{x^2-1}\right)^6$ is α and β then $\alpha-\beta$ is equal to

A. $\alpha-\beta=-132$

B. $\alpha+\beta=60$

C. $\alpha - \beta = 60$

D. $\alpha + \beta = -30$

Answer: A

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17. Solution set of $3^x(3^x - 1) + 2 = |3^x - 1| + |3^x - 2|$ contains

A. is an empty set

B. is a singleton.

C. contains at least four elements.

D. contains exactly two elements .

Answer: B

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18. If $I=\int_1^2 \frac{dx}{\sqrt{2x^3-9x^2+12x+4}}$, then

A. $\frac{1}{9}<I^2<\frac{1}{8}$

B. $\frac{1}{6}<I^2<\frac{1}{2}$

C. $\frac{1}{16}<I^2<\frac{1}{9}$

D. $\frac{1}{8}<I^2<\frac{1}{4}$

Answer: A

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19. Let f(x) is a three degree polynomial for which $f'(-1)=0,\ f''(1)=0,\ f(-1)=10,\ f(1)=6$ then local minima of f(x) exist at

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20. $If\sqrt{2}\frac{\sin\alpha}{\sqrt{1+\cos 2\alpha}}=\frac{1}{7}$ and $\sqrt{\frac{1-\cos 2\beta}{2}}=\frac{1}{\sqrt{10}}$

$\alpha, \beta \in \left(0, \frac{\pi}{2}\right)$ then $\tan(\alpha+2\beta)$ is equal to ________

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21. Let the line $y=mx$ intersects the curve $y^2=x$ at P and tangent to $y^2=x$ at P intersects x-axis at Q. If area ($\triangle$ OPQ) = 4, find $m(m>0)$.

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Others

1. if $y\sqrt{1-x^2}=k-x\sqrt{1-y^2}$ and $y\left(\frac{1}{2}\right)=-\frac{1}{4}$, then $\frac{dy}{dx}$ at x = $\frac{1}{2}$

A. (A) $\frac{\sqrt{5}}{2}$

B. (B) $-\frac{\sqrt{5}}{4}$

C. (C) $\frac{2}{\sqrt{5}}$

D. (D) $-\frac{\sqrt{5}}{2}$

Answer: D

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2. Let X = $\{x : 1 \leq x \leq 50, x \in N\}$

A = $\{x : x \text{is multiple of } 2\}$

B = $\{x : x \text{ is multiple of } 7\}$

Then find number of elements in the smallest subset of X which contain elements of both A and B

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3. If $Q\left(\frac{5}{3}, \frac{7}{3}, \frac{17}{3}\right)$ is foot of perpendicular drawn from $P(1, 0, 3)$ on a line L and if line L is passing through $(\alpha, 7, 1)$, then value of α is

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4. If F(x) is defined in $x \in \left(-\frac{1}{3}, \frac{1}{3}\right)$

f(x) = $\begin{cases} \left(\frac{1}{x}\right)\log_e\left(\frac{1+3x}{1-2x}\right) & x \neq 0 \\ k & x = 0 \end{cases}$ find k such that f(x) is continuous

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5. If system of equation x + y + z = 6 ,x + 2y + 3z = 10, 3x + 2y + λz = μ has more than two solutions. Find $(\mu - \lambda^2)$

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6. If mean and variance of 2, 3, 16, 20, 13, 7, x, y are 10 and 25 respectively then find xy

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7. Let $\int \frac{\cos x dx}{(\sin^3 x)(1+\sin^6 x)^{\frac{2}{3}}} = f(x)(1+\sin^6 x)^{\frac{1}{\lambda}} + C$ then find the value of $\lambda f\left(\frac{\pi}{3}\right)$

A. 4

B. -2

C. 8

D. -4

Answer: B

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8. If $y(x)$ is a solution of differential equation $\sqrt{1-x^2}\frac{dy}{dx}+\sqrt{1-y^2}=0$ such that $y\left(\frac{1}{2}\right)=\frac{\sqrt{3}}{2}$, then

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

B. (B) $y\left(\frac{1}{\sqrt{2}}\right)=\frac{\sqrt{3}}{2}$

C. (C) $y\left(\frac{1}{\sqrt{2}}\right)=\frac{1}{\sqrt{2}}$

D. (D) $y\left(\frac{1}{2}\right)=\frac{1}{2}$

Answer: C

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9. $\lim_{x \to 0} \left(\frac{3x^2 + 2}{7x^2 + 2}\right)^{\frac{1}{x^2}}$ is equal to

A. (A) e^{-2}

B. (B) e^2

C. (C) $e^{\frac{2}{7}}$

D. (D) $e^{\frac{3}{7}}$

Answer: A

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10. Which of the following is tautology

A. $(p \wedge (p \to q)) \to q$

B. $(q \to p \wedge (p \to q)$

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

D. $p \wedge (p \vee q)$

Answer: A

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11. A is a 3×3 matrix whose elements are from the set $\{-1, 0, 1\}$. Find the number of matrices A such that $tr\left(A \times A^T\right) = 3$. Where $tr(A)$ is the trace of A.

A. 572

B. 612

C. 672

D. 682

Answer: C

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12. The mean and the standard deviation (s,d) oFIGURE 10 observe are 20 and 2 respectively are 20 and 2 respectively. Each oFIGURE these 10 obsevations is multiplied by p and then reduced bu q. where $p \ne 0$ and $q \ne 0$. IFIGURE the mean and new s.d. become oFIGURE their orginial values then q is equal to

A. -10

B. -20

C. -5

D. 10

Answer: B

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13. IFIGURE a,b and,c are the greatest values oFIGURE $\hat{}\ (19)C_p,^{20} Cq$ and $\hat{}\ (21)C_r$ respectively then:

A. $\frac{a}{11} = \frac{b}{22} = \frac{c}{42}$

B. $\frac{a}{22} = \frac{b}{11} = \frac{c}{42}$

C. $\frac{a}{22} = \frac{b}{42} = \frac{c}{11}$

D. $\frac{a}{21} = \frac{b}{11} = \frac{c}{22}$

Answer: A

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14. Let A and b be two independent events such that P(A) $= \frac{1}{3}$ and $P(B) = \frac{1}{6}$. Then which oFIGURE the FIGUREollowing is TRUE?

A. $P\left(\frac{A}{B}\right) = \frac{1}{6}$

B. $P\left(\frac{A}{B}'\right) = \frac{1}{3}$

C. $P\left(\frac{A}{B}'\right) = \frac{2}{3}$

D. $P\left(\frac{A}{B}\right) = \frac{5}{6}$

Answer: B

Watch Video Solution

15. The inverse FIGUREunction oFIGURE $FIGURE(x) = \frac{8^{2x} - 8^{-2x}}{8^{2x} + 8^{-2x}}, x \in (-1, 1)$ is

A. $\frac{1}{4}\frac{\log_8(1+x)}{1-x}$

B. $\frac{1}{4}\frac{\log_8(1-x)}{1+x}$

C. $\frac{1}{2}\frac{\log_8(1+x)}{1-x}$

D. $\frac{1}{2}\frac{\log_8(1-x)}{1+x}$

Answer: A

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16. Roots of the equation $x^2 + bx + 45 = 0, b \in R$ lie on the curve `|z + 1| = 2sqrt(10)' , where z is a complex number then

A. $b^2 + b = 12$

B. $b^2 - b = 30$

C. $b^2 - b = 36$

D. $b^2 + b = 30$

Answer: B

Watch Video Solution

17. Consider a function $f(x) = \ln\left(\frac{x^2 + \alpha}{7x}\right)$. If for the given function, Rolle's theorem is applicable in $[3, 4]$ at a point C then find $f''(C)$

A. 43842

B. 1/12

C. 43836

D. -1/6

Answer: A

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18. Let $f(x) = x\cos^{-1}(-\sin|x|), x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

A. $f(0) = -\frac{\pi}{2}$

B. f'(x) is not defined at x = 0

C. f'(x) is increasing in $\left(-\frac{\pi}{2}, 0\right)$ and f'(x) is decreasing in $\left(0, \frac{\pi}{2}\right)$

D. f'(x) is decreasing in $\left(-\frac{\pi}{2}, 0\right)$ and f'(x) is increasing in $\left(0, \frac{\pi}{2}\right)$

Answer: D

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19. Let P be a point on $x^2 = 4y$. The segment joining $A(0, -1)$ and P is divided by point Q in the ratio 1:2, then locus of point Q is

A. $9x^2 = 3y + 2$

B. $9x^2 = 12y + 8$

C. $9y^2 = 12x + 8$

D. $9y^2 = 3x + 2$

Answer: B

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20. Let the line $y = mx$ and the ellipse $2x^2 + y^2 = 1$ intersect at a point P in the first quadrant. If the normal to this ellipse at P meets the co - ordinate axes at $\left(-\frac{1}{3\sqrt{2}}, 0\right)$ and $(0, \beta)$, then β is equal to

A. $\frac{2}{\sqrt{3}}$

B. $\left(2\frac{\sqrt{2}}{3}\right)$

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

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

Answer: C

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21. If $y^2 = ax$ and $x^2 = ay$ intersect at A & B. Area bounded by both curves is bisected by line x = b(given $a > b > 0$). Area of triangle formed by line AB, x = b and x-axis is $\frac{1}{2}$. Then

A. $a^6 - 12a^3 - 4 = 0$

B. $a^6 + 12a^3 - 4 = 0$

C. $a^6 - 12a^3 + 4 = 0$

D. $a^6 + 12a^3 + 4 = 0$

Answer: C

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22. Let ABC is a triangle whose vertices are $A(1, -1), B(0, 2), C(x', y')$ and area of $\triangle ABC$ is 5 and C(x', y') lie on $3x + y - 4\lambda = 0$, then

A. $\lambda = 3$

B. $\lambda = -3$

C. $\lambda = 4$

D. $\lambda = 2$

Answer: A

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23. The system of equation

$3x + 4y + 5z = \mu$

$x + 2y + 3z = 1$

$4x + 4y + 4z = \delta$ is inconsistent, then (δ, μ) can be

A. (4,6)

B. (3,4)

C. (4,3)

D. (1,0)

Answer: C

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24. The shortest distance between the lines $\frac{x-3}{3}=\frac{y-8}{-1}=\frac{z-3}{1}$ and $\frac{x+3}{-3}=\frac{y+7}{2}=\frac{z-6}{4}$ is

A. $3\sqrt{30}$

B. $2\sqrt{30}$

C. $\sqrt{30}$

D. $4\sqrt{30}$

Answer: A

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25. If volume of parallelopiped whose there coterminous edges are $\vec{u}=\hat{i}+\hat{j}+\lambda\hat{k}, \vec{v}=2\hat{i}+\hat{j}+\hat{k}, \vec{w}=\hat{i}+\hat{j}+3\hat{k}$, is 1 cubic unit then cosine of angle between $\vec{u}$ and $\vec{v}$ is

A. $\frac{7}{3\sqrt{10}}$

B. $\frac{7}{6\sqrt{3}}$

C. $\frac{5}{3\sqrt{3}}$

D. $\frac{5}{7}$

Answer: B

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26. Find the sum, $\sum_{k=1}^{20} (1 + 2 + 3 + \ldots . + k)$

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27. If normal at P on the curve $y^2 - 3x^2 + y + 10 = 0$ passes through the point $\left(0, \frac{3}{2}\right)$,then slope of tangent at P is n. The value of |n| is equal to

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28. The equation $2x^2 + (a-10)x + \frac{33}{2} = 2a$ has real roots. Find least positive value of a.

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29. Let $\overrightarrow{a} = \hat{i} - 2\hat{j} + \hat{k}$, $\overrightarrow{b} = \hat{i} - \hat{j} + \hat{k}$ and $\overrightarrow{c}$ is nonzero vector and $\overrightarrow{b} \times \overrightarrow{c} = \overrightarrow{b} \times \overrightarrow{a}$, $\overrightarrow{a} . \overrightarrow{c} = 0$. Find $\overrightarrow{b} . \overrightarrow{c}$.

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

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

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

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

Answer: C

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30. If α and β be the coefficients of x^4 and x^2 respectively in the expansion of $\left(x\sqrt{x^2-1}\right)^6 + x - \sqrt{x^2-1}^6$ then :

A. 48

B. 60

C. -132

D. -60

Answer: C

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31. Differential equation of $x^2 = 4b(y+b)$, where b is a parameter, is

A. $x\left(\frac{dy}{dx}\right)^2 = 2y\left(\frac{dy}{dx}\right) + x^2$

B. $x\left(\frac{dy}{dx}\right)^2 = 2y\left(\frac{dy}{dx}\right) + x$

C. $x\left(\frac{dy}{dx}\right)^2 = y\left(\frac{dy}{dx}\right) + x^2$

D. $x\left(\frac{dy}{dx}\right)^2 = 2y\left(\frac{dy}{dx}\right) + 2x^2$

Answer: B

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32. Image of $(1, 2, 3)$ w.r.t a plane is $\left(-\frac{7}{3}, -\frac{4}{3}, -\frac{1}{3}\right)$ then which of the following points lie on the plane (A) (-1,1,-1) (B) (-1,-1,1) (C) (-1,-1,1) (D) (1,1,-1)

A. $(-1, 1, -1)$

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

C. $(-1, -1, 1)$

D. $(1, 1, -1)$

Answer: D

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33. $\lim_{x \to 0} \frac{\int_0^x t \sin(10t) dt}{x}$ is equal to (A) 1 (B) 10 (C) 5 (D) 0

A. 1

B. 10

C. 5

D. 0

Answer: D

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34. Let P be the set of points (x, y) such that $x^2 \leq y \leq -2x + 3$. Then area of region bounded by points in set P is

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

B. $\frac{32}{3}$

C. $\frac{29}{3}$

D. $\frac{20}{3}$

Answer: B

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35. Let $f(x) = \frac{x[x]}{x^2+1} : (1, 3) \to R$ then range of f(x) is (where [.] denotes greatest integer function)

A. $\left(0, \frac{1}{2}\right) \cup \left(\frac{3}{5}, \frac{7}{5}\right]$

B. $\left(\frac{2}{5}, \frac{1}{2}\right) \cup \left(\frac{3}{5}, \frac{4}{5}\right]$

C. $\left(\frac{2}{5}, 1\right) \cup \left(1, \frac{4}{5}\right]$

D. $\left(0, \frac{1}{3}\right) \cup \left(\frac{2}{5}, \frac{4}{5}\right]$

Answer: B

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36. Let $A = \begin{bmatrix} 2 & 2 \\ 9 & 4 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ then value of $10A^{-1}$ is-

A. $4I - A$

B. $6I - A$

C. $A - 4I$

D. $A - 6I$

Answer: D

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37. Solution set of $3^x(3^x - 1) + 2 = |3^x - 1| + |3^x - 2|$ contains

A. singleton set

B. two elements

C. at least four elements

D. infinite elements

Answer: A

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38. Mean and variance of 20 observation are 10 and 4. It was found, that in place of 11, 9 was taken by mistake find correct variance.

A. 3.99

B. 3.98

C. 4.01

D. 4.02

Answer: A

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39. The system of linear equartions

$\lambda x + 2y + 2z = 5$

$2\lambda x + 3y + 5z = 8$

$4x + \lambda y + 6z = 10$ has:

A. Infinite solutions when $\lambda = 8$

B. Infinite solutions when $\lambda = 2$

C. no solutions when $\lambda = 8$

D. no solutions when $\lambda = 2$

Answer: D

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40. For an A.P. $T_{10} = \frac{1}{20}, T_{20} = \frac{1}{10}$. Find sum of first 200 term. (A) $201\frac{1}{2}$ (B) $101\frac{1}{2}$ (C) $301\frac{1}{2}$ (D) $100\frac{1}{2}$

A. $201\frac{1}{2}$

B. $101\frac{1}{2}$

C. $301\frac{1}{2}$

D. $100\frac{1}{2}$

Answer: D

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41. Let $\alpha = \dfrac{-1 + i\sqrt{3}}{2}$ and $a = (1 + \alpha)\sum_{k=0}^{100} \alpha^{2k}, b = \sum_{k=0}^{100} \alpha^{3k}$. If a and b are roots of quadratic equation then quadratic equation is

A. $x^2 - 102x + 101 = 0$

B. $x^2 - 101x + 100 = 0$

C. $x^2 + 101x + 100 = 0$

D. $x^2 + 102x + 100 = 0$

Answer: A

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42. Let f(x) is a three degree polynomial for which $f'(-1) = 0, f''(1) = 0, f(-1) = 10, f(1) = 6$ then local minima of f(x) exist at

A. $x = 3$

B. $x = 2$

C. $x = 1$

D. $x = -1$

Answer: A

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43. Let A and B are two events such that P(exactly one) = $\frac{2}{5}$, $P(A \cup B) = \frac{1}{2}$ then $P(A \cap B) =$

A. $\frac{1}{10}$

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

C. $\frac{1}{8}$

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

Answer: A

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44. If $I = \int_1^2 \frac{dx}{\sqrt{2x^3 - 9x^2 + 12x + 4}}$, then

A. $\frac{1}{9} < I^2 < \frac{1}{8}$

B. $\frac{1}{3} < I^2 < \frac{1}{2}$

C. $\frac{1}{9} < I < \frac{1}{8}$

D. $\frac{1}{3} < I < \frac{1}{2}$

Answer: A

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45. Normal at $(2, 2)$ to curve $x^2 + 2xy - 3y^2 = 0$ is L. Then perpendicular distance from origin to line L is (A)4 $\sqrt{2}$ (B) 2 (C) 2$\sqrt{2}$ (D) 4

A. $4\sqrt{2}$

B. 2

C. $2\sqrt{2}$

D. 4

Answer: C

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46. If a hyperbola has vertices $(\pm 6, 0)$ and P(10, 16) lies on it, then the equation of normal at P is (A) 2x + 5y = 100 (B) 2x + 5y = 10 (C) 2x -5y = 100 (D) 5x +2y = 100

A. 2x + 5y = 100

B. 2x + 5y = 10

C. 2x − 5y = 100

D. 5x + 2y = 100

Answer: A

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47. If $y = mx + c$ is a tangent to the circle $(x-3)^2 + y^2 = 1$ and also the perpendicular to the tangent to the circle $x^2 + y^2 = 1$ at $\left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$, then

A. $c^2 + 6c + 7 = 0$

B. $c^2 - 6c + 7 = 0$

C. $c^2 + 6c - 7 = 0$

D. $c^2 - 6c - 7 = 0$

Answer: A

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48. Let $\frac{\sqrt{2}\sin\alpha}{\sqrt{1+\cos 2\alpha}} = \frac{1}{7}$ and $\sqrt{\frac{1-\cos 2\beta}{2}} = \frac{1}{\sqrt{10}}$ where $\alpha, \beta \in \left(0, \frac{\pi}{2}\right)$. Then $\tan(\alpha + 2\beta)$ is equal to

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49. The number of words of four letters that can be formed from the letters of the word EXAMINATION is a. 1464 b. 2454 c. 1678 d. none of these

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50. Let the line $y = mx$ intersects the curve $y^2 = x$ at P and tangent to $y^2 = x$ at P intersects x-axis at Q. If area ($\triangle$ OPQ) = 4, find $m(m > 0)$.

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51. $\sum_{n=1}^{7} \frac{n(n+1)(2n+1)}{4}$ is equal to

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52. Use differentials to approximate $\sqrt{25.2}$.

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53. Find the number of solution of $\log_{\frac{1}{2}}|\sin x| = 2 - \log_{\frac{1}{2}}|\cos x|, x \in [0, 2\pi]$

A. 2

B. 4

C. 6

D. 8

Answer: D

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54. If e_1 and e_2 are eccentricities of $\frac{x^2}{18} + \frac{y^2}{4} = 1$ and $\frac{x^2}{9} - \frac{y^2}{4} = 1$ respectively and if the point (e_1, e_2) lies on ellipse $15x^2 + 3y^2 = k$. Then tha value of k

A. 14

B. 15

C. 16

D. 17

Answer: C

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55. Find the integration $\int \frac{dx}{(x-3)^{\frac{6}{7}}(x+4)^{\frac{8}{7}}}$

A. $\left(\frac{x-3}{x+4}\right)^{\frac{1}{7}}$ + c

B. $7\left(\frac{x-3}{x+4}\right)^{\frac{1}{7}}$ + c

C. $7\left(\frac{x-3}{x+4}\right)^{\frac{6}{7}}$ + c

D. $7\left(\frac{x+4}{x-3}\right)^{\frac{6}{7}}$ + c

Answer: A

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56. If $\left|\frac{z-i}{z+2i}\right| = 1, |z| = \frac{5}{2}$ then the value of $|z+3i|$

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

B. $\sqrt{10}$

C. $\sqrt{5}$

D. sqrt3`

Answer: A

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57. If $\overrightarrow{P} = (a+1)\hat{i} + a\hat{j} + a\hat{k}$ $\overrightarrow{Q} = a\hat{i} + (a+1)\hat{j} + a\hat{k}$ $\overrightarrow{R} = a\hat{i} + a\hat{j} + (a+1)\hat{k}$ $\overrightarrow{P}, \overrightarrow{Q}, \overrightarrow{R}$ are coplanar vectors and $3\left(\overrightarrow{P}.\overrightarrow{Q}\right)^2 - \lambda\left|\overrightarrow{R} \times \overrightarrow{Q}\right|^2 = 0$ then value of λ is

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58. If points A (2, 4, 0), B(3, 1, 8), C(3, 1, -3), D(7, -3, 4) are four points then projection of line segment AB on line CD.

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59. If $f(x)=\left\{x, 0<x<\frac{1}{2}, \frac{1}{2}, x=\frac{1}{2}, 1-x, \frac{1}{2}<x<1\right\}$ and $g(x)=\left(x-\frac{1}{2}\right)^2$ then find the area bounded by f(x) and g(x) from $x=\frac{1}{2}$ to $x=\frac{\sqrt{3}}{2}$

A. $\frac{\sqrt{3}}{4}-\frac{1}{3}$

B. $\frac{\sqrt{3}}{4}+\frac{1}{3}$

C. $2\sqrt{3}$

D. $3\sqrt{3}$

Answer: A

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60. If z is a complex number satisfying $|Re(z)| + \ | Im(z) = 4,$ then |z|`

cannot be

A. $\sqrt{7}$

B. $\sqrt{10}$

C. $\sqrt{\frac{17}{2}}$

D. $\sqrt{8}$

Answer: A

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61. If $f(x) = \begin{vmatrix} x+a & x+2 & x+1 \\ x+b & x+3 & x+2 \\ x+c & x+4 & x+3 \end{vmatrix}$ and $a - 2b + c = 1$ then

A. $f(-50) = 501$

B. $f(-50) = -1$

C. $f(50) = 1$

D. $f(50) = -501$

Answer: C

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62. Let a_n is a positive term of a GP and $\sum_{n=1}^{100} a_{2n+1} = 200, \sum_{n=1}^{100} a_{2n} = 200$, find $\sum_{n=1}^{200} a_{2n} = ?$

A. 300

B. 150

C. 175

D. 225

Answer: B

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63. If $\frac{dy}{dx} = \frac{xy}{x^2 + y^2}$, $y(1) = 1$ and $y(x) = e$ then $x =$

A. $\left(\frac{\sqrt{3}}{2}\right)e$

B. $\sqrt{3}e$

C. $\sqrt{2}e$

D. $\frac{e}{\sqrt{2}}$

Answer: B

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64. A random variable X has the following probablitliy distribution :

X :	1	2	3	4	5
$P(x)$:	K^2	$2K$	K	$2K$	$5K^2$

Then $P(X > 2)$

A. $\frac{7}{12}$

B. $\frac{1}{36}$

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

D. $\frac{23}{36}$

Answer: D

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65. if $\int \frac{d\theta}{\cos^2\theta(\tan 2\theta + \sec 2\theta)} = \lambda \tan\theta + 2\log_e|f(\theta)| + C$ where C is a constant of intergration , then the ordered pair $(\lambda, f(\theta))$ is equal to :

A. $(1, 1 + \tan\theta)$

B. $(1, 1 - \tan\theta)$

C. $(-1, 1 + \tan\theta)$

D. $(-1, 1 - \tan\theta)$

Answer: C

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66. If $p \rightarrow (\sim p \vee q)$ is false, the truth values of p and q are , respectively

A. (a) TT

B. (b) TF

C. (c) FT

D. (d) FF

Answer: A

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67. If f(x) = [x] – [x/4] , x ∈ R, where [x] denotes the greatest integer function, then :

(1) lim f(x) (x→4-)exists but lim f(x) (x→4+) does not exist.

(2) Both lim f(x) (x→4-) and lim f(x) (x→4+) exist but are not equal.

(3) lim f(x) (x→4+) exists but lim f(x) (x→4-) does not exist.

(4) f is continuous at x = 4.

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68. Let one end of focal chord of parabola $y^2 = 8x$ is $\left(\frac{1}{2}, -2\right)$, then equation of tangent at other end of this focal chord is

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69. Let $x + 6y = 8$ is tangent to standard ellipse where minor axis is $\frac{4}{\sqrt{3}}$, then eccentricity of ellipse is

A. (a) $\sqrt{\frac{5}{6}}$

B. (b) $\sqrt{\frac{11}{12}}$

C. (c) $\left(\frac{1}{3}\right)\sqrt{\frac{11}{3}}$

D. (d) $\left(\frac{1}{4}\right)\sqrt{\frac{11}{12}}$

Answer: B

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70. if $f(x)$ and $g(x)$ are continuous functions, fog is identity function, $g'(b) = 5$ and $g(b) = a$ then $f'(a)$ is

A. (a) $\frac{2}{5}$

B. (b) $\frac{1}{5}$

C. (c) $\frac{3}{5}$

D. (d)5

Answer: B

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71. The following system of linear equations

7x+6y-2z =0

3x+4y+2z =0

x-2y-6xz=0 has

A. (a)no. solution

B. (b)only trivial solution

C. (c)Infinite non trivial solution for $x = 2z$

D. (d)Infinite non trivial solution for $y = 2z$

Answer: C

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72. Let $x = 2\sin\theta - \sin 2\theta$ and $y = 2\cos\theta - \cos 2\theta$ find $\frac{d^2y}{dx^2}$ at $\theta = \pi$

A. (a) $\frac{3}{8}$

B. (b) $\frac{3}{2}$

C. (c) $\frac{5}{8}$

D. (d) $\frac{7}{8}$

Answer: A

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73. $f(x):[0,5]\rightarrow R, F(x)=\int_0^x x^2 g(x)$, f(1) = 3

g(x) = $\int_1^x f(t)dt$ then correct choice is

A. $F(x)$ has local minimum at $x=1$

B. $F(x)$ has local maximum at $x=1$

C. $F(x)$ has point of inflection at $x=1$

D. $F(x)$ has no critical point

Answer: A

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74. Let both root of equation $ax^2-2bx+5=0$ are α and root of equation $x^2-2bx-10=0$ are α and β. Find the value of $\alpha^2+\beta^2$

A. (a)20

B. (b)25

C. (c)15

D. (d)30

Answer: B

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75. Let $A = \{x : |x| < 2\}$ and $B = \{x : |x - 2| \geq 3\}$ then

A. (1)$A \cap B = (-2, -1]$

B. (2)$A \cup B = R - (2, 5)$

C. (3)$A - B = [-1, 2)$

D. (4)$B - A = R - (-2, 5)$

Answer: D

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76. Let $x = \sum_{n=0}^{\infty} (-1)^n (\tan\theta)^{2n}$ and $y = \sum_{n=0}^{\infty} (\cos\theta)^{2n}$ qhere $\theta \in \left(0, \frac{\pi}{4}\right)$, then

A. (1)x(y+1)=1

B. (2)y(1-x) = 1

C. (3)y(x-1)=1

D. (4)y(1+x) = 1

Answer: B

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77. If the distance between the plane 23x-10y-2z+48 =0 and the plane containing the lines

$\frac{x+1}{2} = \frac{y-3}{4} = \frac{z+1}{3}$ and $\frac{x+3}{2} = \frac{y+2}{6} = \frac{z-1}{\lambda} (\lambda \in R)$ is equal to $\frac{k}{\sqrt{633}}$, then k is equal to ________.

A. 1

B. 2

C. 3

D. 4

Answer: C

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78. If $.^{25}C_0 + 5.^{25}C_1 + 9.^{25}C_2.... 101.^{25}C_{25} = 2^{25}k$ find k = ?

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79. Let circles $(x-0)^2 + (y-4)^2 = k$ and $(x-3)^2 + (y-0)^2 = 1$ touches each other then find the maximum value of 'k'

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80. Let $\left|\overrightarrow{a}\right| = 3, \left|\overrightarrow{b}\right| = 5, \overrightarrow{b}.\overrightarrow{c} = 10$, angle between $\overrightarrow{b}$ and $\overrightarrow{c}$ equal to $\frac{\pi}{3}$. If $\overrightarrow{a}$ is perpendicular $\overrightarrow{b} \times \overrightarrow{c}$ then find the value of $\left|\overrightarrow{a} \times \left(\overrightarrow{b} \times \overrightarrow{c}\right)\right|$

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81. Number of common terms in both sequence 3, 7, 11,...., 407 and 2, 9, 16,....,905 is

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82. If minimum value of term free from x for $\left(\frac{x}{\sin\theta} + \frac{1}{x\cos\theta}\right)^{16}$ is L_1 in $\left[\frac{\pi}{8}, \frac{\pi}{4}\right]$ and L_2 in $\left[\frac{\pi}{16}, \frac{\pi}{8}\right]$, then $\frac{L_2}{L_1}$

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83. Find the length and the foot of perpendicular from the point $(1, 3/2, 2)$ to the plane $2x - 2y + 4z + 5 = 0$.

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84. $f(x) = -\left(\frac{3}{4}\right)x^2 - 8x^3 - \frac{42}{5}x^2 + 105$. Calculate local maxima and local minima.

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85. $(x+y) + (x^2 + xy + y^2) + (x^3 + x^2y + y^2x + y^3) + \ldots\ldots. + n$ terms =

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86. If $\lim_{x \to 1}\left(\frac{x + x^2 + x^3 + \ldots. + x^n - n}{x - 1}\right) = 820$, then find n.

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87. Find the rank of the word MOTHER if all words with letters of MOTHER are written in alphabetical order

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88. If $ax^2 + bx + 6 = 0$ does not have distinct real roots, then find the least value of $3a + b\cdot$

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89. If $y = y(x)$ and $\frac{2 + \sin x}{y + 1}\left(\frac{dy}{dx}\right) = -\cos x, y(0) = 1,$ then $y\left(\frac{\pi}{2}\right) =$

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90. The sum of three consecutive positive terms of a geometric progression is S and their product is 27.Find the minimum value of S.

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91. Let $a^3 + b^2 = 4$. In the expansion of $\left(ax^{\frac{1}{9}} + bx^{-\frac{1}{6}}\right)^{10}$, the term independent of x is 10k. Find the maximum value of k.

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92. Let a,b,c are the A.M. between two numbers such that $a + b + c = 15$ and p,q,r be the H.M. between same numbers such that $\frac{1}{p} + \frac{1}{q} + \frac{1}{r} = \frac{5}{3}$, then the numbers are

A. -1,-9

B. -3,-3

C. 3,3

D. 9,1

Answer: D

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93. $\int_0^2 ||x-1|-x|dx$

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94. Solve the equation $\sin^{-1}6x+\sin^{-1}6\sqrt{3}x=\frac{-\pi}{2}$.

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95. Box-1 contains 30 cards marked from 1 to 30 and Box-2 contains 20 cards marked from 31 to 50. A box is selected and a card is drawn. If the number on the card is non-prime then what is the probability that it came from Box 1.

A. 4/17

B. 6/17

C. 7/17

D. 8/17

Answer: D

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96. The contrapositive of "If i reach the station on time then i will get the train" is-

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97. Let α and β be the roots of the equation $5x^2+6x-2=0$. If $S_n=\alpha^n+\beta^n, n=1, 2, 3....$ then

A. $5S_6+6S_5=2S_4$

B. $6S_4 + 2S_5 = 5S_6$

C. $6S_2 + 5S_6 = 6S_4$

D. $6S_2 + 5S_4 = 2S_6$

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98. $\dfrac{z-\alpha}{z+\alpha}$ is purely imaginary and $|z| = 82$ then $|\alpha|$ is:

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99. $\bar{a}, \bar{b}, \bar{c}$ are three unit vectors such that $|\bar{a}-\bar{b}|^2 + |\bar{a}-\bar{c}|^2 = 8$,then $|\bar{a}+2\bar{b}|^2 + |\bar{a}+2\bar{c}|^2 =$

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100. If the line $3x+4y=k$ is tangent to the circle $x^2+y^2-2x-4y+4=0$, then number of integral values of k is

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101. $P(2, 1, 2), Q(1, 2, 1)$ are two points on a plane which is parallel to the line $2x=3y, z=1$. Find the equation of the plane.

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102. $f(x)=\begin{cases} ae^x+be^{-x} & -1\leq x\leq 1 \\ cx^2 & 1\leq x\leq 3 \\ 2ax+c & 3\leq x\leq 4\end{cases}$,f'(0)+f'(2)=e then the value of a is:

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103. The sum of the series $(2.^1P_0-3.^2P_1+4^3P_2-5.^4P_3+\ldots.51$ terms) +$(1!-2!+3!-\ldots.+51$ terms)=

A. $1+52!$

B. $1+51\times 51!$

C. $2!+51!$

D. $1-52!$

Answer: A

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104. Let $f(x)=(3x-7)x^{\frac{2}{3}}$. The interval in which f(x) is increasing.

A. $\left(0, \frac{14}{15}\right)$

B. $(-\infty, 0)\cup\left(\frac{14}{15}, \infty\right)$

C. $\left(-\infty, \frac{14}{15}\right)$

D. $(0, \infty)$

Answer: B

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105. If $\lim_{x \to 0} \frac{|1 - x + |x||}{|\lambda - x + [x]|} = L$ find L, where $\lambda \in R - \{0, 1\}$ and [.] denotes G.I.F.

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106. A point P on the parabola$y^2 = 12x$. A foot of perpendicular from point P is drawn to the axis of parabola is point N. A line passing through mid-point of PN is drawn parallel to the axis interescts the parabola at point Q. The y intercept of the line NQ is 4. Then-

A. $PN = 4$

B. $PN = 3$

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

D. $MQ = \frac{9}{4}$

Answer: D

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107. Evaluate $\lim_{x \to 0} \frac{8}{x^8}\left\{1 - \cos\frac{x^2}{2} - \cos\frac{x^2}{4} + \cos\frac{x^2}{2}\cos\frac{x^2}{4}\right\}$.

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108. If α and β are roots of $x^2 + px + 2 = 0$ and $\frac{1}{\alpha}, \frac{1}{\beta}$ are the roots of $2x^2 + 2qx + 1 = 0$. Find the value of $\left(\alpha - \frac{1}{\alpha}\right)\left(\beta - \frac{1}{\beta}\right)\left(\alpha + \frac{1}{\beta}\right)\left(\beta + \frac{1}{\alpha}\right)$

A. $\frac{9}{4}(9 - p^2)$

B. $\frac{9}{4}(9 + q^2)$

C. $\frac{9}{4}(9 + p^2)$

D. $\frac{9}{4}(9 - q^2)$

Answer: A

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109. The mean and variance of $5, 7, 12, 10, 15, 14, a, b$ are 10 and 13.5 respectively then value of $|a - b| =$

A. 5

B. 6

C. 7

D. 8

Answer: C

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110. For equation $[x]^2 + 2[x+2] - 7 = 0, x \in R$ number of solution of equation is/are

A. Four integer solution

B. Infinite solution

C. No solution

D. two solution

Answer: B

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111. If $a_1, a_2, a_3, \ldots\ldots a_n$ are in Arithmetic Progression, whose common difference is an integer such that $a_1 = 1, a_n = 300$ and $n \in [15, 50]$ then (S_{n-4}, a_{n-4}) is

A. $(2491, 247)$

B. $(2490, 248)$

C. $(2590, 249)$

D. $(248, 2490)$

Answer: B

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112. If $\lim_{t \to x} \frac{x^2 f^2(t) - t^2 f^2(x)}{t - x} = 0$ and $f(1) = e$ then solution of $f(x) = 1$ is

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

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

C. e

D. $2e$

Answer: A

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113. about to only mathematics

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

B. $2^{1 + \frac{1}{\sqrt{2}}}$

C. $2^{1 + \sqrt{2}}$

D. $2^{1 - \sqrt{2}}$

Answer: A

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114. Center of a circle S passing through the intersection points of circles $x^2+y^2-6x=0 \& x^2+y^2-4y=0$ lies on the line $2x-3y+12=0$ then circle S passes through

A. $(-3, 1)$

B. $(-4, -2)$

C. $(1, 2)$

D. $(0, 0)$

Answer: D

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115. $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \tan^3 x \sin^2 3x \left(2\sec^2 x \sin^2 3x + 3\tan x . \sin 6x\right) dx$

A. $-\frac{1}{36}$

B. $-\frac{1}{72}$

C. $-\frac{1}{18}$

D. $\frac{1}{36}$

Answer: C

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116. If the angle of elevation of a cloud from a point 200 m above a lake is 30° and the angle of depression of its reflection in the lake is 60° , then the height of the cloud above the lake, is (a) 200 m (b) 500 m (c) 30 m (d) 400 m

A. 400 m

B. $400\sqrt{2}$ m

C. $400\sqrt{3}$ m

D. 200 m

Answer: A

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117. The contrapositive of statement:

If f(x) is continuous at x=a then f(x) is differentiable at x=a

A. If $f(x)$ is continuous at x=a then $f(x)$ is not continuous at x=a

B. If $f(x)$ is not differentiable at x=a then $f(x)$ is not continuous at x=a

C. If $f(x)$ is differentiable at x=a then $f(x)$ is continuous at x=a

D. If $f(x)$ is differentiable at x=a then $f(x)$ is not continuous

Answer: B

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118. If equation of directrix of an ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is x=4, then normal to the ellipse at point $(1, \beta), (\beta > 0)$ passes through the point (where eccentricity of the ellipse is $\frac{1}{2}$)

A. $\left(1, \frac{3}{2}\right)$

B. $\left(-1, \frac{3}{2}\right)$

C. $(-1, -3)$

D. $(3, -1)$

Answer: A

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119. If points A and B lie on x-axis and points C and D lie on the curve $y=x^2-1$ below the x-axis then maximum area of rectangle ABCD is

A. $\frac{4\sqrt{3}}{3}$

B. $\frac{4\sqrt{3}}{9}$

C. $\dfrac{4\sqrt{3}}{27}$

D. $\dfrac{8\sqrt{3}}{9}$

Answer: B

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120. PQ is a diameter of circle $x^2 + y^2 = 4$. If perpendicular distances of P and Q from line $x + y = 2$ are α and β respectively then maximum value of $\alpha\beta$ is

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121. If $\dfrac{dy}{dx} - \dfrac{y - 3x}{\ln(y - 3x)} = 3$ then

A. $\dfrac{\ln(y - 3x)}{2} = x + c$

B. $\dfrac{\ln^2(y - 3x)}{2} = x + c$

C. $\dfrac{\ln(y - 3x)}{2} = x^2 + c$

D. $\frac{\ln^2(y-3x)}{2} = x^2 + c$

Answer: B

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122. Find the distance of the point $(1, -2, 3)$ from the plane $x - y + z = 5$ measured parallel to the line $\frac{x}{2} = \frac{y}{3} = \frac{z}{-6}$.

A. 7

B. $\frac{1}{7}$

C. 1

D. 5

Answer: D

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123. Suppose $x_1, x_2, \ldots. x_{50}$ are 50 sets each having 10 elements and $Y_1, Y_2, \ldots. Y_n$ are n sets each having 5 elements. Let $\cup_{i=1}^{50} X_i = \cup_{i=1}^{n} Y_i = Z$ and each element of Z belong to exactly 25 of X_i and exactly 6 of Y_i then value of n is

A. 20

B. 22

C. 24

D. 26

Answer: C

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124.

class	0 – 10	10 – 20	20 – 30
f	2	x	2

If variance of variable is 50 then x=

A. 5

B. 6

C. 4

D. 3

Answer: C

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125. Let A is 3×3 matrix such that $Ax_1 = B_1, Ax_2 = B_2, Ax_3 = B_3$

where

$$x_1 = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}, x_2 = \begin{bmatrix} 0 \\ 2 \\ 1 \end{bmatrix}, x_3 = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$$,br>

$B_1 = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}, B_2 = \begin{bmatrix} 0 \\ 2 \\ 0 \end{bmatrix}, B_3 = \begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix}$ then find $|A|$.

A. 0

B. 1

C. 2

D. 3

Answer: C

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126. $\int\left(e^{2x}+2e^{x}-e^{-x}-1\right)e^{e^{x}+e^{-x}}dx=g(x)e^{e^{x}+e^{-x}}$, then find $g(0)$.

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