MATHS

RESONANCE ENGLISH

TEST SERIES

Mathematics

1. The least positive vlaue of the parameter 'a' for which there exist atleast one line that is tangent to the graph of the curve $y = x^3 - ax$, at one point and normal to the graph at another point is $\frac{p}{q}$, where p and q ar relatively prime positive integers. Find product pq.

A. 2

B. 4

C. 3

D. 1

Answer: A

Watch Video Solution

2. Locus of midpoint of chord of circle $x^2+y^2=1$ which subtend right angle at $(2, -1)$ is

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

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

C. $x^2+y^2-2x+y+1=0$

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

Answer: D

Watch Video Solution

3. If f(x)=x + tan x and f si the inverse of g, then g'(x) equals

A. $\dfrac{1}{1+(g(x)\ -^{2}\ )}$

B. $\dfrac{1}{2+(g(x)-x)^{2}}$

C. $\dfrac{1}{1-(g(x)-x)^{2}}$

D. $\dfrac{1}{2-(g(x)-x)^{2}}$

Answer: B

Watch Video Solution

4. Tangents PA and PB are drawn to parabola $y^2=4x$ from any arbitrary point P on the line $x+y=1$.

Then vertex of locus of midpoint of chord AB is

A. a. $(-1, -2)$

B. b. $\left(\frac{3}{2}, 1\right)$

C. c. $\left(-\frac{3}{2}, -1\right)$

D. $\left(\frac{3}{2}, -1\right)$

Answer: C

Watch Video Solution

5. If $\lim_{n \to \infty} \frac{n.2^n}{n(3x-4)^n + n.2^{n+1} + 2^n} = \frac{1}{2}$ where $\mathrm{n}\varepsilon N$ then the number of integers in the range of x is (a) 0 (b) 2 (c) 3 (d) 1

A. 0

B. 2

C. 3

D. 1

Answer: D

Watch Video Solution

6. Eccentricity of ellipse $2(x-y+1)^2+3(x+y+2)^2=5$ is

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

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

C. $\dfrac{1}{2}$

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

Answer: B

Watch Video Solution

7. If $\left(\tan^{-1}x\right)^3+\left(\tan^{-1}y\right)^3=1-3\tan^{-1}x.\tan^{-1}y$. Then which of the following may be true (a) $\dfrac{x+y}{\tan 1}=-2$ (b) $\dfrac{\tan^{-1}x}{1-\tan^{-1}y}=2$ (c) $\dfrac{\tan^{-1}x}{1-\tan^{-1}y}=2$ (d) $\dfrac{x+y}{\cot 1}=1$

A. $\dfrac{x+y}{\tan 1}=-2$

B. $\dfrac{\tan^{-1}x}{1-\tan^{-1}y}=2$

C. $\dfrac{x+y}{\tan 1}=2$

D. $\dfrac{x+y}{\cot 1}=1$

Answer: A

Watch Video Solution

8. If $f:R\to R$ is a continuous function satisfying $f(0)=1$ and $f(2x)-f(x)=x\,\forall x\varepsilon R$ and $\lim_{n\to\infty}\left(f(x)-f\left(\frac{x}{2^n}\right)\right)=P(x)$. Then $P(x)$ is

A. a constant function

B. a linear function

C. a quadratic polynomial in x

D. a cubic polynomial in x

Answer: B

Watch Video Solution

9. $\tan^{-1}(\sin x) = \sin^{-1}(\tan x)$ holds true for (A) $\mathrm{x}\varepsilon R$ (B) $2n\pi - \frac{\pi}{2} \leq x \leq 2n\pi + \frac{\pi}{2}(\mathrm{n}\varepsilon z)$ (C) $\mathrm{x}\varepsilon\{0, z^{+}\}$ (D) $\mathrm{x}\varepsilon n\pi(\mathrm{n}\varepsilon z)$

A. $\mathrm{x}\varepsilon R$

B. $2n\pi - \frac{\pi}{2} \leq x \leq 2n\pi + \frac{\pi}{2}(\mathrm{n}\varepsilon z)$

C. $\mathrm{x}\varepsilon\{0, z^{+}\}$

D. $\mathrm{x}\varepsilon n\pi(\mathrm{n}\varepsilon z)$

Answer: D

Watch Video Solution

10. The function $f(x) = (x^2 - 1)\left|x^2 - 3x + 3\right| + \cos(|x|)$ is not differentiable at

A. -1

B. 0

C. 1

D. 2

Answer: C

Watch Video Solution

11. Consider parabola $P_1 \equiv y = x^2$ and $P_2 \equiv y^2 = -8x$ and the line $L \equiv lx + my + n = 0$. Which of the following holds true (a point (α, β) is called rational point if α and β are rational)

A. a. If l, m, n are odd integers then the line L can not intersect parabola P_1 in a rational point.

B. b. Line L will be tangent to P_1 if $m, \frac{l}{2}, n$ are in G.P.

C. c. If line L is common tangent to P_1 and P_2 then $l + m + n = 0$

D. d. If line L is common chord of P_1 and P_2 then $l - 2m + n = 0$

Answer: A::B::C::D

Watch Video Solution

12. If the normal at four points $P_i(x_i, (y_i)l, I = 1, 2, 3, 4$ on the rectangular hyperbola $xy = c^2$ meet at the point $Q(h, k)$, prove that

$x_1 + x_2 + x_3 + x_4 = h, y_1 + y_2 + y_3 + y_4 = k$

$x_1x_2x_3x_4 = y_1y_2y_3y_4 = -c^4$

A. $x_1 + x_2 + x_3 + x_4 = 3$

B. $y_1 + y_2 + y_3 + y_4 = 4$

C. $y_1y_2y_3y_4 = 4$

D. $x_1x_2x_3x_4 = -4$

Answer: A::B::D

Watch Video Solution

13. Let $f(x) = x^3 - x^2 + x + 1$ and

$$g(x) = \begin{cases} \max . f(t) & 0 \le t \le x \quad \text{for} o \le x \le 1 \\ 3 - x & 1 < x \le 2 \end{cases}$$

Discuss the continuity and differentiability of g(x) in (0,2).

A. $g(x)$ is discontinuous at $x = 1$

B. $g(x)$ is continuous at $x = 1$

C. $g(x)$ is differentiable at $x = 1$

D. $g(x)$ is non differentiable at $x = 1$

Answer: B::D

Watch Video Solution

14. The sum of the roots of the equation $\tan^{-1}(x+3) - \tan^{-1}(x-3) = \sin^{-1}\frac{3}{5}$ is

A. 3

B. 2

C. 0

D. 4

Answer: D

Watch Video Solution

15. For an ellipse having major and minor axis along x and y axes respectivley, the product of semi major and semi minor axis is 20. Then maximum value of product of abscissa and ordinate of any point on the ellipse is greater than (A) 5 (B) 8 (C) 10 (D) 15

A. 5

B. 8

C. 10

D. 15

Answer: A::B

Watch Video Solution

16. If $f:[0,1] \to R$ is defined as $f(x) = \begin{cases} x^3(1-x)\sin\frac{1}{x^2} 0 < x \leq 1 \\ 0x = 0 \end{cases}$,

then

A. f is continuous in $[0, 1]$

B. f is differentiable in $[0, 1]$

C. f is discontinuous in $[0, 1]$

D. f is not differentiable in $[0, 1]$

Answer: A::B

Watch Video Solution

17. If $f(x) = \sqrt[3]{8x^3 + mx^2} - nx$ such that $\lim_{x \to \infty} f(x) = 1$ then (A) $m + n = 15$ (B) $m - n = 10$ (C) $m - n = 12$ (D) $m + n = 14$

A. $m + n = 15$

B. $m - n = 10$

C. $m - n = 12$

D. $m + n = 14$

Answer: B::D

Watch Video Solution

18. Find the coordinates of the points on the curve $y = x^2 + 3x + 4,$ the tangents at which pass through the origin.

A. $(-2, 14)$

B. $(2, 14)$

C. $(2, -2)$

D. $(-2, 2)$

Answer: B::D

Watch Video Solution

19. Minimum value of $\left(\sin^{-1}x\right)^2+\left(\cos^{-1}x\right)^2$ is greater than

A. $\frac{\pi^2}{4}$

B. $\frac{\pi^2}{16}$

C. $\frac{3\pi^2}{4}$

D. $\frac{3\pi^2}{32}$

Answer: B::D

Watch Video Solution

20. If $y+b=m_1(x+a)$ and $y+b=m_2(x+a)$ are two tangents to the parabola $y^2=4ax$, then

A. $m_1+m_2+m_1m_2=0$

B. $m_1+m_2-m_1m_2=\frac{2}{3}$

C. $m_1+m_2+2m_1m_2=\frac{1}{3}$

D. $m_1+m_2-2m_1m_2=1$

Answer: A::B::D

Watch Video Solution

21. If $f(x) = \lim_{m \to \infty} \lim_{n \to \infty} \cos^{2m} n!\pi x$ then the range of f(x) is

A. $f(\sqrt{3}) = 1$

B. $f(3) = 1$

C. $f(\sqrt{2}) = 0$

D. $f(1) = 2$

Answer: B::C

Watch Video Solution

22. Tangents are drawn to the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ parallel to the sraight line $2x - y = 1$. The points of contact of the tangents on the hyperbola are (A) $\left(\frac{9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$ (B) $\left(-\frac{9}{2\sqrt{2}}, -\frac{1}{\sqrt{2}}\right)$ (C) $(3\sqrt{3}, -2\sqrt{2})$ (D) $(-3\sqrt{3}, 2\sqrt{2})$

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

B. $\left(-\frac{9}{2\sqrt{2}}, -\frac{1}{\sqrt{2}}\right)$

C. $\left(\frac{9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

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

Answer: B::C

Watch Video Solution

23. Q. For every integer n, leta_n and b_n be real numbers. Let function $f: R \to R$ be given by a $f(x) = \{a_n + \sin \pi x, f \text{ or } x \in [2n, 2n+1],$ $b_n + \cos \pi x, f \text{ or } x \in (2n+1, 2n)$ for all integers n.

A. $a_{n-1} - b_{n-1} = 0$

B. $a_n - b_n = 1$

C. $a_n - b_{n+1} = 1$

D. $a_{n-1} - b_n = -1$

Answer: B::D

Watch Video Solution

24. Let a and b are real numbers such that the function $f(x) = \begin{cases} -3ax^2 - 2 & x < 1 \\ bx + a^2 & x \geq 1 \end{cases}$ is differentiable of all $x \varepsilon R$, then

A. $a - b = 7$

B. $ab = 12$

C. $a + b = 15$

D. $ab = -6$

Answer: A::D

Watch Video Solution

25. If both $\lim_{x \to c^-} f(x)$ and $\lim_{x \to c^+} f(x)$ exist finitely and are equal, then the function f is said to have removable discontinuity at $x = c$. If both the limits i.e. $\lim_{x \to c^-} f(x)$ and $\lim_{x \to c^+} f(x)$ exist finitely and are not equal, then the function f is said to have non-removable discontinuity at $x = c$.

Which of the following function not defined at $x = 0$ has removable discontinuity at the origin?

A. $f(x) = \dfrac{1}{1 + 2^{\cot x}}$

B. $f(x) = x\dfrac{\sin(\pi)}{x}$

C. $f(x) = \dfrac{1}{\ln|x|}$

D. $f(x) = \sin\left(\dfrac{|\sin x|}{x}\right)$

Answer: A::D

Watch Video Solution

26. If both $\lim_{x \to c^-} f(x)$ and $\lim_{x \to c^+} f(x)$ exist finitely and are equal, then the function f is said to have removable discontinuity at $x = c$. If both the limits i.e. $\lim_{x \to c^-} f(x)$ and $\lim_{x \to c^+} f(x)$ exist finitely and are not equal, then the function f is said to have non-removable discontinuity at $x = c$.

which of the following function has non-removable discontinuity at $x = 0$?

A. $f(x) = \dfrac{1}{1 + 2^{\frac{1}{x}}}$

B. $f(x) = \tan^{-1}\dfrac{1}{x}$

C. $f(x) = \dfrac{e^{\frac{1}{x}} - 1}{e^{\frac{1}{x}} + 1}$

D. $f(x) = \dfrac{|\sin x|}{|x|}$

Answer: D

Watch Video Solution

27. In a $ABC, A \equiv (\alpha, \beta), B \equiv (1, 2), C \equiv (2, 3),$ point A lies on the line $y = 2x + 3,$ where α, β are integers, and the area of the triangle is S such that $[S] = 2$ where $[\ .]$ denotes the greatest integer function. Then the possible coordinates of A can be $(-7, -11)$ $(-6, -9)$ $(2, 7)$ $(3, 9)$

A. $a - b = 7$

B. $a + b = 5$

C. minimum value of the quadratic expression whose zero's are a and b and leading coefficient is 4 is -49

D. minimum value of the quadratic expession whose zero's are a and b and leading coefficient is -1 is $\frac{49}{4}$

Answer: A::B::C::D

Watch Video Solution

28. In a ABC, $A \equiv (\alpha, \beta)$, $B \equiv (1, 2)$, $C \equiv (2, 3)$, point A lies on the line $y = 2x + 3$, where α, β are integers, and the area of the triangle is S such that $[S] = 2$ where $[\ .]$ denotes the greatest integer function. Then the possible coordinates of A can be $(-7, -11)$ $(-6, -9)$ $(2, 7)$ $(3, 9)$

A. $\dfrac{\alpha}{\beta} = \dfrac{3}{7}$

B. $3\alpha\beta = 14$

C. $2\alpha + 3\beta = 18$

D. $\alpha + 6\beta = 30$

Answer: A::C::D

Watch Video Solution

29. Let $f(x)$ be real valued continuous function on R defined as $f(x) = x^2 e^{-|x|}$ then $f(x)$ is increasing in

A. $(0, 2)$

B. $(2, \infty)$

C. $(-2, 0)$

D. $(-\infty, 2)$

Answer: A::D

Watch Video Solution

30. Let $f(x)$ be real valued continuous function on R defined as

$f(x) = x^2 e^{-|x|}$ then

$f(x)$ is increasing in

A. $\frac{e^2}{4} < k < \infty$

B. $\frac{e^2}{2}$

C. $\frac{0 < k \leq 4}{e^2}$

D. $\frac{e^2}{4}$

Answer: A::D

Watch Video Solution

31. Let all chords of parabola $y^2 = x + 1$ which subtends right angle at $(1, \sqrt{2})$ passes through (a, b) then the value of $a + b^2$ is

Watch Video Solution

32. $\lim_{x \to \frac{\pi}{2}} \frac{1 - \sin x \sin 3x \sin 5x . \sin 7x}{\left(\frac{\pi}{2} - x\right)^2}$ is k then $\frac{k}{6}$ equal to

Watch Video Solution

33. If derivative of $y = |x - 1|^{\sin x}$ at $x = -\frac{\pi}{2}$ is $(1 + a\pi)^b$ then value of $\left|\frac{1}{a} + 4b\right|$ is

Watch Video Solution

34. The value of $\sin^{-1}(\sin 10)$ is

Watch Video Solution

35. $f:[0, 2\pi] \rightarrow [-1, 1]$ and $g:[0, 2\pi] \rightarrow [-1, 1]$ be respectively given by $f(x) = \sin$ and $g(x) = \cos x$.

Define $h:[0, 2\pi] \rightarrow [-1, 1]$ by $h(x) = \begin{cases} \max\{f(x), g(x)\} \text{if} 0 \leq x \leq \pi \\ \min\{f(x), g(x)\} \text{if} \pi < x \leq 2\pi \end{cases}$ number of points at which $h(x)$ is not differentiable is

Watch Video Solution

36. If solution of $\cot\left(\sin^{-1}\sqrt{1-x^2}\right) = \sin\left(\tan^{-1}\left(x\sqrt{6}\right)\right), x \neq 0$ is $\frac{1}{p}\sqrt{\frac{q}{r}}$ where p, q, r are prime then value of $\frac{p+q-r}{p}$ is

Watch Video Solution

37. about to only mathematics

Watch Video Solution

38. about to only mathematics

Watch Video Solution

39. Value of limit $\lim_{x \to 0^+} x^{x^x} . \ln(x)$ is

A. 1

B. 0

C. Does not exists

D. 2

Answer: B

Watch Video Solution

40. Let A, B and C be square matrices of order 3×3 with real elements. If A is invertible and $(A - B)C = BA^{-1}$, then

A. $C(A - B) = BA^{-1}$

B. $C(A - B) = A^{-1}B$

C. $(A - B)C = A^{-1}B$

D. $C(B - A) = A^{-1}B$

Answer: B

Watch Video Solution

41. If (a, b) and (c, d) are two points on the whose equation is $y = mx + k$, then the distance between (a, b) and (c, d) in terms of a, c and m is

A. $|a + c|\sqrt{1 + m^2}$

B. $|a-c|\sqrt{1+m^2}$

C. $\dfrac{|a-c|}{\sqrt{1+m^2}}$

D. $|a-c|\left(a+m^2\right)$

Answer: B

Watch Video Solution

42. Solve the equation

$(x)^2=[x]^2+2x$

where $[x]$ and (x) are integers just less than or equal to x and just greater than or equal to x respectively.

A. 0

B. 1

C. 2

D. infinite

Answer: D

Watch Video Solution

43. Let $x^2 + y^2 + xy + 1 \geq a(x + y) \, \forall x, y \in R,$ then the number of possible integer (s) in the range of a is________.

A. 0

B. 2

C. 3

D. infinite

Answer: C

Watch Video Solution

44. Let P, Q, R and S be the feet of the perpendiculars drawn from point $(1, 1)$ upon the lines $y = 3x + 4, y = -3x + 6$ and their angle bisectors respectively. Then equation of the circle whose extremities of a diameter are R and S is

A. $3x^2 + 3y^2 + 104x - 110 = 0$

B. $x^2 + y^2 + 104x - 110 = 0$

C. $x^2 + y^2 - 18x - 4y + 16 = 0$

D. $3x^2 + 3y^2 - 4x - 18y + 16 = 0$

Answer: D

Watch Video Solution

45. Let $[.]$ denote G.I.F. and $t \geq 0$ and $S = \left\{(x, y) : (x - T)^2 + y^2 \leq T^2\right.$ where $T = t - [t]\}$. Then which of the following is/are INCORRECT?

A. the point $(0, 0)$ does not belong to S for an t

B. S is contained in the first quadrant for all $t > 5$

C. $0 \leq$ Area $S < \pi$ for all t

D. the centre of S for any t is on the line $y = x$

Answer: A::B::D

Watch Video Solution

46. A function is definded as

$$f(x) = \lim_{n \to \infty} \begin{cases} \cos^{2n} x & \text{if} \quad x < 0 \\ \sqrt[n]{1 + x^n} & \text{if} \quad 0 \leq x \leq 1 \\ \frac{1}{1 + x^n} & \text{if} \quad > 1 \end{cases}$$

which of the following does not hold good ?

A. a. continuous at $x = 0$ but discontinuous at $x = 1$

B. b. continuous at $x = 1$ but discontinuous at $x = 0$

C. c. discontinuous at both $x = 1$ and $x = 0$

D. d. continuous at both $x = 1$ and $x = 0$

Answer: A::B::D

Watch Video Solution

47. If $[.]$ denotes the greatest integer function and $x, y\varepsilon Rr, \mathrm{n}\varepsilon N$ then which of the following is true? (A) (B) (C) (D)

A. a. $[x+y] \geq [x]+[y]$

B. b. $[x+y] \leq [x]+[y]$

C. c. $\left[\frac{[x]}{n}\right] = \left[\frac{x}{n}\right]$

D. d. $\left[x+\frac{1}{2}\right] = [2x]-[x]$

Answer: A::C::D

Watch Video Solution

48. The number of solutions to $\left|e^{|x|}-3\right| = K$ is

A. Two if $K=0$

B. Three if $K>2$

C. Three if $K=2$

D. Four if $K=1$

Answer: C::D

Watch Video Solution

49. Let $f(x) = \begin{cases} x+1 & -1 \leq x \leq 0 \\ -x & 0 < x \leq 1 \end{cases}$ then

A. Intermediate mean value theorem applies to $f(x)$ on $[-1, 1]$

B. $f(x)$ attains maximum and minimum value

C. $f(x)$ satisfies Lagrange's mean value theorem on $[-1, 1]$

D. $f(x)$ is bounded.

Answer: B::D

Watch Video Solution

50. Angle bisector of angles subtended by the chord of a circle in the same segmetn DOES NOT represent

A. A family of lines passing through a fixed point lying on the circle

B. A family of lines passing through a fixed point inside the circle

C. A family of lines passing through a fixed point lying outside the circle

D. A family of lines through which never pass through a fixed point

Answer: B::C::D

Watch Video Solution

51. Consider the function $f(x) = \begin{cases} x^{\frac{\sin(\pi)}{x}} & \text{for} x > 0 \\ 0 & \text{for} x = 0 \end{cases}$

Then, the number of points in $(0, 1)$ where the derivative f'(x) vanishes is

A. $f'(x)$ vanishes atleast once in $\left[\frac{1}{3}, \frac{1}{2}\right]$

B. $f'(x)$ vanishes atleast once in $\left[\frac{1}{4}, \frac{1}{2}\right]$

C. $f'(x)$ satisfies Roll's theorem on $[0, 1]$

D. $f'(x)$ vanishes atleast once in $\left[\frac{1}{k+1}, \frac{1}{k}\right]$ for every $K\varepsilon N$

Answer: A::B::D

Watch Video Solution

52. Which of the following is true ?

A. if $f(x)$ is continuous at $x = c$ and $g(x)$ is discontinuous at $x = c$ then $(f.\ g)(x)$ must be discontinuous

B. If $f(x)$ is continuous at $x = c$ and $g(x)$ is discontinuous at $x = c$ then $(f.\ g)(x)$ may be continuous.

C. If $f(x)$ and $g(x)$ are discontinuous at $x = c$, then the product function must be discontinuous.

D. If $f(x)$ and $g(x)$ are discontinuous at $x = c$, then the product function may be continuous.

Answer: B::D

Watch Video Solution

53. Prove that $\lim_{x \to 2} [x]$ does not exists, where [.] represents the greatest integer function.

A. $f(x) = [x] - x, c = 0$

B. $f(x) = [|x|] - [2x - 1], c = 3$

C. $f(x) = \{x\}^2 - \{-x\}^2, c = 0$

D. $f(x) = \dfrac{\tan(sgnx)}{(sgnx)}, c = 0$

Answer: A::C::D

Watch Video Solution

54. $f(x)$ is defined for $x \geq 0$ and has a continuous derivative. It satisfies $f(0) = 1, f'(0) = 0$ and $(1 + f(x))f'(x) = 1 + x$. The value $f(1)$ cannot be:

A. a. 0

B. b. 1.20

C. c. 1.50

D. d. -2

Answer: A::D

Watch Video Solution

55. Let $A \cdot B = A^T B^{-1}$ where A^T represents transpose of matrix A and B^{-1} represents inverse of square matrix B. This operation is defined when the number of rows of A is equal to the number of rows of B. Matrix A is said to be orthogonal if $A^{-1} = A^T$

If $A \cdot B$ is defined then which of the following operations are always define?

A. $(A \cdot B) \cdot A^T$

B. $(A \cdot B)^T + A$

C. $(A \cdot B) + A^T$

D. $A \cdot B + B$

Answer: A::B::C::D

Watch Video Solution

56. Let $A \cdot B = A^T B^{-1}$ where A^T represents transpose of matrix A and B^{-1} represents inverse of square matrix B. This operation is defined when the number of rows of A is equal to the number of rows of B. Matrix A is said to be orthogonal if $A^{-1} = A^T$

If $A \cdot B$ is defined then which of the following operations are always define?

A. $(A \cdot B)^{-1} = B \cdot A$ if A is symmetric matrix

B. $(A \cdot B)^T = A \cdot B^{-1}$ if B is orthogonal matrix

C. $(A \cdot B)^T = B^{-1} \cdot A$ if A is orthogonal matrix

D. $(A \cdot B)^{-1} = B \cdot A^{-1}$ if B is symmetric matrix

Answer: A::C::D

Watch Video Solution

57. A curve is represented parametrically by the equations $x = e^1 \cos t$ and $y = e^1 \sin t$, where t is a parameter. Then,

The relation between the parameter 't' and the angle α between the tangent to the given curve and X-axix is given by, 't' equals

A. $\frac{\pi}{2} - \alpha = t$

B. $\frac{\pi}{4} + \alpha = t$

C. $\frac{\pi}{4} - \alpha = t$

D. $\alpha - \frac{\pi}{4} = t$

Answer: D

Watch Video Solution

58. A curve is represented parametrically by the equations $x = e^1 \cos t$ and $y = e^1 \sin t$, where t is a parameter. Then, The value of $\frac{d^2y}{dx^2}$ at the point, where $t = 0$, is

A. 1

B. -2

C. 2

D. 3

Answer: C

Watch Video Solution

59. Find the locus of the point of intersection of the perpendicular tangents of the curve $y^2 + 4y - 6x - 2 = 0$.

A. $2x - 1 = 0$

B. $2x + 3 = 0$

C. $2y + 3 = 0$

D. $2x + 5 = 0$

Answer: D

Watch Video Solution

60. The points $A(2-x, 2, 2), B(2, 2-y, 2), C(2, 2, 2-z)$ and $D(1, 1, 1)$ are coplanar, then locus of $P(x, y, z)$ is

A. $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}=1$

B. $x+y+z=1$

C. $\frac{1}{1-x}+\frac{1}{1-y}+\frac{1}{1-z}=1$

D. $\frac{1}{1-x}+\frac{1}{1-y}+\frac{1}{1-z}=2$

Answer: A

Watch Video Solution

61. $\cot^{-1}\left(-\frac{1}{2}\right)+\cot^{-1}\left(-\frac{1}{3}\right)$ is equal to

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

B. $\frac{5\pi}{4}$

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

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

Answer: B

Watch Video Solution

62. If the focus of a parabola is $(3, 3)$ and its directrix is $3x - 4y = 2$ then the length of its latus rectum is

A. 2

B. 4

C. 3

D. 5

Answer: A

Watch Video Solution

63. If $a_1, a_2, a_3, \ldots a_{n+1}$ are in arithmetic progression, then $\sum_{k=0}^{n} .^{n} C_{k . a_{k+1}}$ is equal to (a)$2^n(a_1 + a_{n+1})$ (b)$2^{n-1}(a_1 + a_{n+1})$ (c) $2^{n+1}(a_1 + a_{n+1})$ (d)$(a_1 + a_{n+1})$

A. $2^n(a_1 + a_{n+1})$

B. $2^{n-1}(a_1 + a_{n+1})$

C. $2^{n+1}(a_1 + a_{n+1})$

D. $(a_1 + a_{n+1})$

Answer: B

Watch Video Solution

64. A line makes an angle θ with each of the x-and z-axes. If the angle β, which it makes with the y-axis, is such that $\sin^2\beta = 3\sin^2\theta, then \cos^2\theta$ equals a. $\frac{2}{3}$ b. $\frac{1}{5}$ c. $\frac{3}{5}$ d. $\frac{2}{5}$

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

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

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

D. Data inappropriate

Answer: C

Watch Video Solution

65. The period of the function f(x)=sin(x+3-[x+3]), where $[\cdot]$ denotes greatest integer function, is

A. $[5, 6]$

B. $[5, 6)$

C. R

D. I

Answer: B

Watch Video Solution

66. about to only mathematics

A. $9x^2 - 8y^2 + 18x - 9 = 0$

B. $9x^2 - 8y^2 - 18x + 9 = 0$

C. $9x^2 - 8y^2 - 18x - 9 = 0$

D. $9x^2 - 8y^2 + 18x + 9 = 0$

Answer: B

Watch Video Solution

67. Statement 1: If $e^{xy} + \ln(xy) + \cos(xy) + 5 = 0$, then $\frac{dy}{dx} = -\frac{y}{x}$.
Statement 2: $\frac{d}{dx}(xy) = 0$, y is a function of $x \Rightarrow \frac{dy}{dx} = -\frac{y}{x}$.

A. Statement 1: is True, Statement 2 is True , Statement 2 is a correct explanation for statement 1

B. Statement 1 is True, Statement 2 is True Statement 2 is NOT a correct explanation for Statement 1

C. Statement 1 is True, Statement 2 is False

D. Statement 1 is False, Statement 2 is True

Answer: A

Watch Video Solution

68. A spherical balloon is expanding. If the radius in increasing at the rate of 2 inches per minute the rate at which the volume increases (in cubic inches per minute) when the radius is 5 inches is

A. 10π

B. 100π

C. 200π

D. 50π

Answer: C

Watch Video Solution

69. Let $D_r = \begin{vmatrix} a & 2^r & 2^{16}-1 \\ b & 3(4^r) & 2\left(4^{16}-1\right) \\ c & 7(8^r) & 4\left(8^{16}-1\right) \end{vmatrix}$, then the value of $\sum_{k=1}^{16} D_k$, is (a) 0 (b) $a+b+c$ (c)$ab+bc+ca$ (d) 1

A. 0

B. $a+b+c$

C. $ab+bc+ca$

D. 1

Answer: A

Watch Video Solution

70. Let $\overrightarrow{a}$ and $\overrightarrow{b}$ be unit vectors such that $\left|\overrightarrow{a}+\overrightarrow{b}\right|=\sqrt{3}$. Then find the value of $\left(2\overrightarrow{a}+5\overrightarrow{b}\right).\left(3\overrightarrow{a}+\overrightarrow{b}+\overrightarrow{a}\times\overrightarrow{b}\right)$

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

B. $\frac{13}{2}$

C. $\frac{39}{2}$

D. $\frac{23}{2}$

Answer: C

Watch Video Solution

71. $\lim_{x\to\infty}\frac{e^{1/x^2}-1}{2\tan^{-1}(x^2)-\pi}$ is equal to

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

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

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

D. Does not exists

Answer: B

Watch Video Solution

72. The equation of the tangent to the curve $y = \sqrt{9 - 2x^2}$ at the point where the ordinate & the abscissa are equal is

A. $2x + y - \sqrt{3} = 0$

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

C. $2x - y - 3\sqrt{3} = 0$

D. $2x + y - 3\sqrt{3} = 0$

Answer: D

Watch Video Solution

73. Let P and Q be two statements, then ~$(\sim P \wedge Q) \wedge (P \vee Q)$ is logically equivalent to

A. Q

B. P

C. $P \vee Q$

D. $P \wedge Q$

Answer: B

Watch Video Solution

74. If $4\sin^{-1}x + \cos^{-1} = \pi$ then x equals

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

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

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

D. 2

Answer: C

Watch Video Solution

75. If $\sum_{i=1}^{15} x_i = 45,\ A = \sum_{i=1}^{15} (x_i - 2)^2,\quad B = \sum_{i=1}^{15} (x_i - 3)^2$ and $C = \sum_{i=1}^{15} (x_i - 5)^2$ then Statement 1: $\min\ (A, B, C) = A$ Statement 2: The sum of squares of deviations is least when taken from man.

A. Statement 1: is True, Statement 2 is True , Statement 2 is a correct explanation for statement 1

B. Statement 1 is True, Statement 2 is True Statement 2 is NOT a correct explanation for Statement 1

C. Statement 1 is True, Statement 2 is False

D. Statement 1 is False, Statement 2 is True

Answer: D

Watch Video Solution

76. If $f(x) = \sin|x| - e^{|x|}$ then at $x = 0$, $f(x)$ is

A. Continuous but not differentiable

B. Neither continuous nor differentiable

C. Both continuous and differentiable

D. Discontinuous but may be differentiable

Answer: C

Watch Video Solution

77. If $y = f\left(\frac{2x-1}{x^2+1}\right)$ and $f'(x) = \sin x^2$, then find $\frac{dy}{dx}$

A. $\sin\left(\frac{2x-1}{(x^2+1)^2}\cdot\left(\frac{2+2x+2x^2}{(x^2+1)^2}\right)\right)$

B. $\sin\left(\frac{2x-1}{(x^2+1)^2}\cdot\left(\frac{2+2x-2x^2}{(x^2+1)^2}\right)\right)$

C. $\sin\left(\frac{2x-1}{(x^2+1)^2}\cdot\left(\frac{2+2x-x^2}{(x^2+1)^2}\right)\right)$

D. $\sin(x^2).\left(\frac{2+2x-2x^2}{(x^2+1)^2}\right)$

Answer: B

Watch Video Solution

78. The no. of solutions of the equation $a^{f(x)}+g(x)=0$ where a>0 , and g(x) has minimum value of 1/2 is :-

A. One

B. Two

C. Infinitely many

D. Zero

Answer: D

Watch Video Solution

79. Statement 1: If $A \cap B = \phi$ then $n((A \times B) \cap (B \times A)) = 0$

Statement 2: $A - (B \cup C) = A \cap B' \cap C'$

A. Statement 1: is True, Statement 2 is True , Statement 2 is a correct explanation for statement 1

B. Statement 1 is True, Statement 2 is True Statement 2 is NOT a correct explanation for Statement 1

C. Statement 1 is True, Statement 2 is False

D. Statement 1 is False, Statement 2 is True

Answer: B

Watch Video Solution

80. Angle between diagonals of a prallelogramm whose sides are represented by $a = 2\hat{i} + \hat{j} + \hat{k}$ and $b = \hat{i} - \hat{j} - \hat{k}$.

A. $\cos^{-1}\left(\frac{1}{3}\right)$

B. $\cos^{-1}\left(\frac{1}{2}\right)$

C. $\cos^{-1}\left(\frac{4}{9}\right)$

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

Answer: A

Watch Video Solution

81. The distance between the origin and the tangent to the curve $y=e^{2x}+x^2$ drawn at the point $x=0$ is $\left(1, \frac{1}{3}\right)$ (b) $\left(\frac{1}{3}, 1\right)$ $\left(2, -\frac{28}{3}\right)$ (d) none of these

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

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

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

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

Answer: B

Watch Video Solution

82. The function $f(x)=1+x(\sin x)[\cos x], 0 < x \leq \pi/2$, where $[.]$ denotes greatest integer function

A. is discontinuous is $(0, \pi/2)$

B. is strictly decreasing in $(0, \pi/2)$

C. is strictly increasing in $(0, \pi/2)$

D. has global maximum value 1

Answer: D

Watch Video Solution

83. Consider the following statements

Statement 1: The range of $\log_1\left(\frac{1}{1+x^2}\right)$ is $(-\infty, \infty)$

Statement 2: If $0 < x \leq 1$, then $\log_1 = x\varepsilon(-\infty, 0]$

Which of the following is correct

A. Statement 1: is True, Statement 2 is True , Statement 2 is a correct explanation for statement 1

B. Statement 1 is True, Statement 2 is True Statement 2 is NOT a correct explanation for Statement 1

C. Statement 1 is True, Statement 2 is False

D. Statement 1 is False, Statement 2 is True

Answer: D

Watch Video Solution

84. System of equations $x+2y+z=0, 2x+3y-z=0$ and $(\tan\theta)x+y-3z=0$ has non-trival solution then number of value (s) of $\theta \varepsilon(-\pi, \pi)$ is equal to

Watch Video Solution

85. If $x, y \in R$, satisfies the equation $\frac{(x-4)^2}{4} + \frac{y^2}{9} = 1$, then the difference between the largest and the smallest valus of the expression $\frac{x^2}{4} + \frac{y^2}{9}$ is_____

Watch Video Solution

86. If the sum of the coefficients in the expansion of $(2x + 3cx + c^2x^2)^{12}$ vanishes, then absolute value of sum of the values of c is

Watch Video Solution

87. The maximum slope of curve y $= -x^3 + 3x^2 + 9x - 27$ is

Watch Video Solution

88. If in the expansion of $\left(\frac{1}{x} + x \tan x\right)^5$ the ratio of 4^{th} term to the 2^{nd} term is $\frac{2}{27}\pi^4$, then value of x can be

Watch Video Solution

89. If $n_1 + n_2 + n_3 + n_4 = 20$ such that $n_i \geq i + 1 \forall i \in \{1, 2, 3, 4\}$ and $n_i \text{n} \in I$ then number of solutions are

A. a. 84

B. b. 126

C. c. 286

D. d.140

Answer:

Watch Video Solution

90. The number of 4 digit numbers that can be made using exactly two digits out of 1,2,3,4,5,6 and 7

A. 126

B. 210

C. 284

D. 294

Answer: D

Watch Video Solution

91. There are n urns each containing (n+1) balls such that ith urn contains i white balls and (n+1-i) red balls. Let u_i be the event of selecting ith urn, i=1,2,3..., n and w denotes the event of getting a white ball. IfP(u_i)=c, where c is a constant then P(u_n/w) is equal to

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

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

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

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

Answer:

Watch Video Solution

92. Let $N = 3^{n_1} + 5^{n_2} + 9^{n_3}$ where $n_1, n_2, n_3 \varepsilon [1, 9]$. Then number of ways of selecting the values of n_1, n_2, n_3 so that N is divisible by 4 is

A. 720

B. 72

C. 10

D. 0

Answer:

Watch Video Solution

93. If $ax^2 + \frac{b}{x} \geq c$ for all positive x where a gt 0 and b gt show that $27ab^2 \geq 4c^3$

A. $27ab^2 \geq 4c^3$

B. $27ab^2 \leq 4c^3$

C. $9ab^2 \geq 4c^2$

D. $9ab^2 \leq 4c^2$

Answer:

Watch Video Solution

94. If

$f''(x) > \forall \in R, f(3) = 0$ and $g(x) = f\left(\tan^2 x - 2\tan x + 4y\right) 0 < x <$

,then g(x) is increasing in

A. (a, b) is range of $\tan x$

B. (a, b) is range of $\tan^{-1} x$

C. (a, b) is range of $\tan^{-1}\left(\sqrt{3-t}+1\right)$

D. (a, b) is range $\tan^{-1}\left(\frac{1}{\sqrt{3-t}}+1\right)$

Answer:

Watch Video Solution

95. If $y = f\left(\frac{2x-1}{x^2+1}\right)$ and $f'(x) = \sin x^2$, then find $\frac{dy}{dx}$

A. $2\cos 1$

B. $2\sin 1$

C. 2

D. 0

Answer:

Watch Video Solution

96. Let $\vec{a} = \hat{i} - \hat{k}$, $\vec{b} = x\hat{i} + \hat{j} + (1-x)\hat{k}$ and $\vec{c} = y\hat{i} + x\hat{j} + (1+x-y)\hat{k}$, then $\left[\vec{a}\,\vec{b}\,\vec{c}\right]$ depends on

A. only x

B. only y

C. neither x nor y

D. both x and y

Answer:

Watch Video Solution

97. The projection of $\hat{i}+\hat{j}+\hat{k}$ on the whole equation is $\vec{r}=(3+\lambda)\hat{i}+(2\lambda-1)\hat{j}+3\lambda\hat{k}$, λ being the scalar parameter is:

A. $\dfrac{3}{\sqrt{11}}$

B. $\dfrac{6}{\sqrt{14}}$

C. $\dfrac{6}{\sqrt{11}}$

D. $\dfrac{3}{\sqrt{14}}$

Answer:

Watch Video Solution

98. A plane meets the coordinate axes at $A, BandC$ respectively such that the centroid of triangle ABC is $(1, -2, 3)$. Find the equation of the plane.

A. $6x - y + 2z = 18$

B. $6x - 3y + 2z = -18$

C. $x - 2y + 3z = 6$

D. $x - 2y + 3z = 14$

Answer:

Watch Video Solution

99. For $N = 50400$ the number of divisor of N, which are divisible by 6, divisible by

A. 2

B. 3

C. 4

D. 5

Answer:

Watch Video Solution

100. Which of the following statements is correct ?

A. $100! + 1$ is not divisible by any natural number between 2 and 100.

B. If n objects in a row, then the number of ways of selecting two of these objects such that they are not next to each other is $.^{n-1}C_2$.

C. The number of ways in which we can arrange 20 white identical and 20 black identical balls in a row, so that neighbouring balls are of different colors is 2

D. none of these

Answer:

Watch Video Solution

101. A ship is fitted with three engines E_1, E_2 and E_3. The engines function independently of each other with respective probabilities $\frac{1}{2}, \frac{1}{4},$ and $\frac{1}{4}$. For the ship to be operational at least two of its engines must function. Let X denote the event that the ship is operational and let X_1, X_2 and X_3 denote, respectively, the events that the engines E_1, E_2 and E_3 are function. Which of the following is/are true? (a) $P\left(X_1^c|X\right) = \frac{3}{16}$ (b)P(exactly two engines of the ship are functioning $|X$) $= \frac{7}{8}$ (c) $P(X|X_2) = \frac{5}{6}$ (d) $P(X|X_1) = \frac{7}{16}$

A. $P\left[X_1^c \mid x\right] = \frac{3}{16}$

B. $P[\text{ Exactly two engines of the ship are functioning} X] = \frac{7}{8}$

C. $P[X \mid X_2] = \frac{5}{18}$

D. $P[X \mid X_1] = \frac{7}{18}$

Answer:

Watch Video Solution

102. Thre are n identical red balls & m identical green balls. The number of different linear arrangements consisting of n red balls but not necessarily all the green balls" is $.^{x}C_y$ then:

A. $x = m + n$

B. $y = m$

C. $x = m + n + 1$

D. $y = n$

Answer:

Watch Video Solution

103. Let N be the number of ways in which 10 different prizes be given to 5 students, so that one boy get exactly 4 prizes and the rest of the students can get any number of prizes. Then N is divisible by

A. 900

B. 400

C. 1200

D. 1400

Answer:

Watch Video Solution

104. A lot contains 50 defective and 50 non-defective bulbs.Two bulbs are drawn at random, one at a time, with replacement. The events A,B and C are defined as follows:

A= (first bulb is detective)

B= (second bulb is non-defective)

C= (two bulbs are both defective or both non-defective)

Then

A. A and B are independent

B. A and C are independent

C. B and C are independent

D. A,B and C are independent

Answer:

Watch Video Solution

105. For any two events A and B in a sample space:

A. $P(A \mid B) = P(A),$ if A, B are independent

B. $P(A \cup B) = P(A) - P(\overline{A} \cap \overline{B})$ does not hold

C. $P(A \cup B) = 1 - P(\overline{A})P(\overline{B})$ if A and B are independent

D. $P(A \cup B) = 1 - P(\overline{A})P(\overline{B})$ if A and B are disjoint

Answer:

Watch Video Solution

106. The function $f(x) = \sqrt{ax^3 + bx^2 + cx + d}$ has its non-zero local minimum and local maximum values at $x = -2$ and $x = 2$, respectively. If a is a root of $x^2 - x - 6 = 0$, then find a,b,c and d.

A. $a = 3$

B. $b = 0$

C. $c = 24$

D. $d = 32$

Answer:

Watch Video Solution

107. Let $\overrightarrow{a} = \hat{i} - \hat{j} + \hat{k}$, $\overrightarrow{b} = 2\hat{i} + \hat{j}$ and $\overrightarrow{c} = 3\hat{j} - 2\hat{k}$, $\overrightarrow{x}, \overrightarrow{y}, \overrightarrow{z}$ be linear combination of $\overrightarrow{a}, \overrightarrow{b}, \overrightarrow{b}, \overrightarrow{c}, \overrightarrow{c}, \overrightarrow{a}$ respectively and $\overrightarrow{r} = \lambda\overrightarrow{x} + \mu\overrightarrow{y} + \delta\overrightarrow{z}$, λ, μ, δ are some scalars. If $\overrightarrow{d}$ is equally inclined to three vectors $\overrightarrow{a}, \overrightarrow{b}, \overrightarrow{c}$ then

A. a. $\overrightarrow{x} . \overrightarrow{d} = 14$

B. b. $\overrightarrow{y} . \overrightarrow{d} = 3$

C. c. $\overrightarrow{z} . \overrightarrow{d} = 0$

D. d. $\overrightarrow{r} . \overrightarrow{d} = 0$

Answer:

Watch Video Solution

108. If $g(x)$ is monotonically increasing and $f(x)$ is monotonically decreasing for $x \in R$ and if $(gof)(x)$ is defined for $x \in R$, then prove that $(gof)(x)$ will be monotonically decreasing function. Hence prove that$(gof)(x+1) \leq (gof)(x-1)$.

A. a. $g(f(ax+1)) > g(f(ax-1))$ if $a < 0$

B. b. $g(g(ax+1) > g(g(ax-1))$ if $a < 0$

C. c. $g(f(ax+1) < g(f(ax-1))$ if $a > 0$

D. d. $g(g(ax+1)) > g(g(ax-1))$ if $a > 0$

Answer:

Watch Video Solution

109. The radius of a right circular cylinder increases at a constant rate. Its altitude is a linear function of the radius and increases three times as fast as the radius when the radius is $1\ cm$ and the altitude is $6\ cm$. When the radius is $6cm$, the volume is increasing at the rate of $1\ \frac{cm^3}{s}$. When the radius is $36cm$, the volume is increasing at a rate of $n\ \frac{cm^3}{s}$. What is the value of n?

A. 11

B. 22

C. 3

D. 33

Answer:

Watch Video Solution

110. Let $f(x) = 2\sin^3 x + \lambda \sin^2 x, \; -\frac{\pi}{2} < x < \frac{\pi}{2}$. If $f(x)$ has exactly one minimum and one maximum, then λ cannot be equal to

A. 1

B. 0

C. 3

D. 4

Answer:

Watch Video Solution

111. For the function $f(x) = x \cos \frac{1}{x}, x \geq 1$which one of the following is incorrect ?

A. for at least one x in the interval $[1, \infty], f(x+2) - f(x) < 2$

B. $\lim_{x \to \infty} f'(x) = 1$

C. for all x in the interval $[1, \infty), f(x+2) - f(x) > 2$

D. $f'(x)$ is strictly decreasing in the interval $[1, \infty)$

Answer:

Watch Video Solution

112. a, b ,c are three unit of vectors, a and b are perpendicular to each other and vector c is equally inclined to both a and b at an angle θ. If $c = \alpha a + \beta b + (a \times b)\gamma$, where α, β and γ are constant, then

A. $\alpha = \beta = \cos \theta$

B. $\alpha = \cos \theta, \beta = \sin \theta$

C. $\gamma^2 = \cos 2\theta$

D. $\gamma^2 = -\cos 2\theta$

Answer:

Watch Video Solution

113. The vector equations of two lines L_1 and L_2 are respectively $\overrightarrow{r} = 17\hat{i} - 9\hat{j} + 9\hat{k} + \lambda\left(3\hat{i} + \hat{j} + 5\hat{k}\right)$ and $\overrightarrow{r} = 15\hat{}8\hat{j} - \hat{k} + \mu\left(4\hat{i} + 3\hat{j}\right)$ I L_1 and L_2 are skew lines II $(11, -11, -1)$ is the point of intersection of L_1 and L_2 III $(-11, 11, 1)$ is the point of intersection of L_1 and L_2. IV $\cos^{-1}\left(\frac{3}{\sqrt{35}}\right)$ is the acute angle between $\_1$ and L_2 then , Which of the following is true?

A. $(-11, 11, 1)$ is the point of intersection of L_1 and L_2

B. $(11, -11, -1)$ is the point of intersection of L_1 and L_2

C. L_1 and L_2 are skew lines

D. $\cos^{-1}\left(\frac{3}{\sqrt{35}}\right)$ is the acute angle between L_1 and L_2

Answer:

Watch Video Solution

114. If $r = \hat{i} + \hat{j} + \lambda\left(2\hat{i} + \hat{j} + 4\hat{k}\right)$ and $r \cdot \left(\hat{i} + 2\hat{j} - \hat{k} = 3\right.$ are equations of a line and a plane respectively, then which of the following is incorrect?

A. line is perpendicular to the plane

B. line lies in the plane

C. line is parallel to the plane

D. line cuts the plane obliquely

Answer:

Watch Video Solution

115. f: $D \rightarrow R$, $f(x)=$ (x^2 +bx+c)/$\left(x^2+b_1x+c_1\right)$ whereα, β are the roots of the equation $x^2+bx+c=0$ and α_1, β_1 are the roots of $x^2+b_1x+c_1=0$. Now answer the following questions for f(x). A combination of graphical and analytical approach may be helpful in solving these problems. (If α_1 and β_1 are real, then f(x) has vertical asymptote at x = α_1, β_1

A. $f(x)$has a maxima in $[\alpha_1, \beta_1]$ and a minima in $[\alpha, \beta]$

B. $f(x)$ has a minima in $(\alpha_1, \beta_1]$ and a maxima in (α, β)

C. $f'(x) > 0$ whenever denfined

D. $f'(x) < 0$ whenever defined

Answer:

Watch Video Solution

116. f: $D \rightarrow R$, $f(x)=$ (x^2 +bx+c)/$\left(x^2+b_1x+c_1\right)$ whereα, β are the roots of the equation $x^2+bx+c=0$ and α_1, β_1 are the roots of

$x^2 + b_1 x + c_1 = 0$. Now answer the following questions for f(x). A combination of graphical and analytical approach may be helpful in solving these problems. (If α_1 and β_1 are real, then f(x) has vertical asymptote at x = α_1, β_1

A. $f'(x) = 0$ has real and distinct roots

B. $f'(x) = 0$ has real and equal roots

C. $f'(x) = 0$ has imaginary roots.

D. $f(x) = 1$ has atleast one real root

Answer:

Watch Video Solution

117. A multiple choice question has n options, of whlch only one is correct. If a student does home work, then it is sure to identify the correct answer, otherwise answer is choosen at random. Let E be the event that student does home work with $P(E) = p$ and F be the event that student answers question correctly

If $n = 5, p = 0.75$ the value of $P(E/F) \geq \lambda$, then λ can be

A. $\frac{8}{16}$

B. $\frac{10}{16}$

C. $\frac{12}{16}$

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

Answer:

Watch Video Solution

118. A multiple choice question has n options, of whlch only one is correct. If a student does home work, then it is sure to identify the correct answer, otherwise answer is choosen at random. Let E be the event that student does home work with $P(E) = p$ and F be the event that student answers question correctly

If the largest set of values of p for which relaton $P(E/F) \geq P(E)$ holds is $[a, b]$ then

A. $b + a = 1$

B. $b + a = \frac{1}{2}$

C. $b - a = 1$

D. $b - a = \frac{1}{2}$

Answer:

Watch Video Solution

119. Find the equation of the plane passing through $A(2, 2, -1), B(3, 4, 2)$ and $C(7, 0, 6)$.

A. Equation of plane P_2 is $x - z + 2 = 0$

B. Equation of plane P_2 is $x + z - 4 = 0$

C. Area of triangle AB_1C_1 is $3\sqrt{2}$

D. Area of triangle AB_1C_1 is 6

Answer:

Watch Video Solution

120. A plane P_1 passing through $A(1, 2, 3), B(3, 1, 5)$ and $C(-1, 0, 1)$ is rotated about the median passing through A by right angle. Let B_1, C_1 be the new positions of B and C respectively. P_2 be a new plane passes through A, B_1, C_1 and P_3 be a plane given by the equation $2x + 3y + \lambda z = 2$, (where $\lambda \varepsilon R$) Now answer the following:

If planes P_1, P_2 and P_3 intersect atleast one point then λ can be

A. 0

B. 1

C. 4

D. no such value of λ exists

Answer:

Watch Video Solution

121. A line makes angles $\angle, \beta, \gamma$ and δ with the diagonals of a cube. Show that $\cos^2\alpha + \cos^2\beta + \cos^2\gamma + \cos^2\delta = 4/3$.

Watch Video Solution

122. The plane $x - y - z = 2$ is rotated through 90° about its line of intersection with the plane $x + 2y + z = 2$. The distance of $(-1, -2, -1)$ from the plane in the new position is $\lambda\sqrt{\frac{6}{7}}$. Then the value of λ is equal to

Watch Video Solution

123. The volme of a tetrahedron having vertices $A(1, 1, 1), B(1, 2, 4), C(3, 1, -2)$ and $D(4, 3, 1)$ is x cubic unit then $2x =$

Watch Video Solution

124. The number of integral values of a in $[0, 10)$ so that function, $f(x) = x^3 - 3(7-a)x^2 - 3(9-a^2)x + 2017$ assume local minimum value at some $x \varepsilon R^-$

Watch Video Solution

125. A boy has 3 library tickets and 8 books of his interest in the library. Of these 8 he does not want to borrow mathematics part II, unless mathematics part I is also borrowed. If number of ways can be choose the three books to be borrowed is λ, then number of perfect squares less than λ.

Watch Video Solution

126. The center of the ellipse $\frac{(x+y-2)^2}{9} + \frac{(x-y)^2}{16} = 1$is

Watch Video Solution

127. An isosceles triangle that can be inscribed in an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ having its vertex coincident with one extremity of major axis has the maximum area equal to $\frac{m\sqrt{n}}{4}ab$ (m, n are prime numbers) then $\frac{m^2 - n}{3} =$

Watch Video Solution

128. If the range of the function $y = \frac{x-1}{x+1}$ on the interval $0 \leq x \leq 4$ be $[a, b]$ then the value of $5b - 2a =$

Watch Video Solution

129. Two smallest squares are chose at random on a chess board and $\frac{p}{q}$ is the probability that they have exactly one corner in common (p and q are co-prime) then $q - 20p =$

Watch Video Solution

130. There are four bags. The first bag contains 10 identical red balls, the second bag contains 4 identical black balls, the third contains 2 identical green balls and the last bag contain 6 identical blue balls. In how may ways 6 balls can be selected if at least one ball of each colour is selected.

A) 9 B) 12 C) 15 D) 18

Watch Video Solution

131. Two dice are thrown n times in succession . The probability of obtaining a double six atleast once is

Watch Video Solution

132. Let $n \geq 2$ be integer. Take n distinct points on a circle and join each pair of points by a line segment. Color the line segment joining every pair of adjacent points by blue and the rest by red. If the number of red and blue line segments are equal, then the value of n is

Watch Video Solution