MATHS

BOOKS - ML KHANNA

FUNCTIONS

Problem Set 1

1. Let a function is defined as $f(x) = \frac{a^x + a^{-x}}{2}$, $a > 0$, what is the value of $f(x+y) + f(x-y)$?

A. $2f(x).\ F(y)$

B. $f(x).\ f(y)$

C. $f(x)\ /\ f(y)$

D. None

Answer: A

Watch Video Solution

2. If $f(x) = \cos(\log x), then f(x^2) f(y^2) - \frac{1}{2}\left[f\left(\frac{x^2}{y^2}\right) + f(x^2y^2)\right]$ has the value

A. -2

B. -1

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

D. None of these

Answer: D

Watch Video Solution

3. If $f(x) = \cos(\log x), \quad \text{then} \quad f(x) \cdot f(y) - \frac{1}{2}\left[f\left(\frac{x}{y}\right) + f(xy)\right]$ has the value

A. -2

B. -1

C. 0

D. $1/2$

Answer: C

Watch Video Solution

4. If $f(x) = \sin(\log x)$ then the value of $E = f(xy) + f\left(\frac{x}{y}\right) - 2f(x)\cos(\log y)$ is

A. -1

B. 0

C. 1

D. None of these

Answer: B

Watch Video Solution

5. If $f(x) = \cos\left[\pi^2\right]x + \cos\left[-\pi^2\right]x$ where [x] stands for the greatest integer function then

A. $f\left(\frac{\pi}{2}\right) = -1$

B. $f(\pi) = 1$

C. $f(-\pi) = 0$

D. $f\left(\frac{\pi}{4}\right) = \frac{1}{\sqrt{2}}$

Answer: A::C::D

Watch Video Solution

6. A function f(x) is defined as under :

$$f(x) = \begin{cases} 1 + [x] & , \quad x < -2 \\ |x| & , \quad x \geq -2 \end{cases}$$

then

$f[f(-2.5)]$ is

A. 3

B. 2

C. 1

D. 0

Answer: B

Watch Video Solution

7. If g (x) be a function defined on [-1,1] . If the area of the equilateral triangle with two of its vertices at (0,0) and [x,g (x)]is $\sqrt{3/4}$ them the function is

A. $g(x) = \pm\sqrt{(1-x^2)}$

B. $g(x) = -\sqrt{(1-x^2)}$

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

D. $g(x) = \pm\sqrt{(1+x^2)}$

Answer: B::C

Watch Video Solution

8. The graph of the function $\cos x \cos(x+2) - \cos^2(x+1)$ is

A. a straight line passing through $(0, -\sin^2 1)$ with slope

B. a straight line passing through (0,0)

C. a parabola with vertex $(1, -\sin^2 1)$

D. a straight line passing through the point $\left(\frac{\pi}{2}, -\sin^2 1\right)$ and parallel to the x-axis.

Answer: D

Watch Video Solution

9. The value of b and c for which the identity $f(x+1) - f(x) = 8x + 3$ is satisfied, where f $(x) = bx^2 + cx + d$, are

A. b=2,c=1

B. $b = 4, c = -1$

C. $b = -1, c = 4$

D. none

Answer: B

Watch Video Solution

10. If f (0) = 2, f (1) = 3 and f (x+2) =2f (x) - f (x + 1) for every real x then f (5) is equal to

A. 13

B. 1

C. 5

D. 7

Answer: A

Watch Video Solution

11. If $f(x+1)+f(x-1)=2f(x)$ and $f(0)=0$, then f$(n), n \in N$is

A. nf(1)

B. $[f(1)]^n$

C. 0

D. None

Answer: A

Watch Video Solution

12. If

$f(x+y)=f(x)+f(y)$ for all $x, y \in R$ and f (1) = λ, then $f(n), n \in N$

is

A. λ^n

B. $\frac{1}{\lambda^n}$

C. $n\lambda$

D. None

Answer: C

Watch Video Solution

13. Let $f(x) = px^2 + qx + r,$ where p,q,r are rational and $f: Z \to Z$ where Z is the set of integers. Then p+q is

A. negative integer

B. an integer

C. non-integral rational

D. none

Answer: B

Watch Video Solution

14. If f(x) $=\frac{1-x+x^2}{1+x+x^2} \leq 3 \forall x \in R$ then max. value of. $\frac{1+2x+4x^2}{1-2x+4x^2}$ is

A. 9

B. 6

C. 3

D. $3/2$

Answer: C

Watch Video Solution

15. If f (x) is a polynomial satisfying f(x) f (1/ x) = f (x) + f (1/x) and f (3) = 28, then f (2) is given by

A. 63

B. 65

C. 67

D. None of these

Answer: D

Watch Video Solution

16. If $g(x)$ is a polynomial satisfying $g(x)g(y)=g(x)+g(y)+g(xy)-2$ for all real x, y and $g(2)=5$, then $g(3)$ is equal to

A. 10

B. 24

C. 21

D. None of these

Answer: A

Watch Video Solution

17. If $2f(x) - 3f\left(\frac{1}{x}\right) = x^2$, x is not equal to zero, then f (2) is equal to

A. $5/2$

B. $-7/4$

C. -1

D. None of these

Answer: B

Watch Video Solution

18. If $2f(x) + 3f(-x) = x^2 - x + 1$, then the value of f'(1) is equal to

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

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

C. $\frac{6}{5}$

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

Answer: D

Watch Video Solution

19. If $f(x) + 2f(1-x) = x^2 + 2 \forall x \in R$ then f (x) is equal to

A. $x^2 - 2$

B. 1

C. $\frac{1}{3}(x-2)^2$

D. None of these

Answer: C

Watch Video Solution

20. If $f: R \to R$ is a function such that $f(x) = x^3 + x^2 f'(1) + x f''(2) + f'''(3)$ for all $x \in R$, then $f(2) - f(1)$ is

A. $f(0)$

B. $-f(0)$

C. $f'(0)$

D. $-f'(0)$

Answer: B

Watch Video Solution

21. The function $f(x) = \log\left(\frac{1+x}{1-x}\right)$ satisfies the equation

A. f(x+2) – 2f (x+1) + f (x) =0

B. $f\left(\frac{2x}{1+x^2}\right) = 2f(x)$

C. $f(p)f(q) = f(p+q)$

D. $f(p) + f(q) = f\left(\frac{p+q}{1+pq}\right)$

Answer: B::D

Watch Video Solution

22. If $f(x+2y, x-2y) = xy$, then f (x, y) equals

A. $\frac{x^2 - y^2}{8}$

B. $\frac{x^2 - y^2}{4}$

C. $\frac{x^2 + y^2}{4}$

D. $\frac{x^2 - y^2}{2}$

Answer: A

Watch Video Solution

23. A function f $:R \to R$ satisfies

$\sin x \cos y[f(2x+2y) - f(2x-2y)] = \cos x \sin y[f(2x+2y) + f(2x-2y$

If $f'(0) = \frac{1}{2}$, then f (x) =

A. f"(x)

B. $-F(x)$

C. $4f(x)$

D. $-4f''(x)$

Answer: D

Watch Video Solution

24. If $f\left(x+\frac{1}{x}\right)=x^2+\frac{1}{x^2}$, then f(t) equals to :

A. x^2-2 for all $x \neq 0$

B. x^2-2 for all x satisfying $|x| \geq 2$

C. x^2-2 for all x satisfying $|x|<2$

D. None of these

Answer: B

Watch Video Solution

25. If f (x) is a function satisfying $f(x+y)=f(x)f(y)\,\forall x, y \in N,$ such that f (1) = 3 and $\sum_{x=1}^{n} f(x) = 120,$ then the value of n is

A. 4

B. 5

C. 6

D. None of these

Answer: A

Watch Video Solution

26. The equivalent definition of the function given by

$$f(x)=\begin{cases}2x, & x \geq 0\\ 0, & x<0\end{cases}$$

is

A. $f(x) = |x|$

B. $f(x) = 2x$

C. $f(x) = |x| + x$

D. $f(x) = 2|x|$

Answer: C

Watch Video Solution

27. Let g(x)=1+x-[x] and

$$f(x) = \begin{cases} -1, & x < 0 \\ 0, & x = 0 \\ 1, & x > 0 \end{cases}.$$

Then for all x,f{g(x)} is equal to

A. x

B. 1

C. $f(x)$

D. $g(x)$

Answer: B

Watch Video Solution

28. If f (x) = ax +b and g(x) = x+d then (fog) x=(gof) x implies

A. $f(a) = g(c)$

B. $f(d) = g(b)$

C. $f(b) = g(a)$

D. $f(c) = g(a)$

Answer: B

Watch Video Solution

29. Given $f(x) = \log\{(1+x)/(1-x)\}$ and $g(x) = \left(3x + x^3\right)/\left(1 + 3x^2\right)$. Then f (g(x)] equals

A. $-f(x)$

B. $3[f(x)]$

C. $[f(x)]^3$

D. None of these

Answer: B

Watch Video Solution

30. Let $f(x) = \frac{\alpha x}{x+1}, x \neq -1$. Then, for what value of α is $f\{f(x)\} = x$?

A. $\sqrt{2}$

B. $-\sqrt{2}$

C. 1

D. -1

Answer: D

Watch Video Solution

31. If $f(x) = \frac{ax+b}{cx+d}$ and (fof) x= x, `then

A. a=b=1

B. $d = a$

C. $d = -a$

D. $a = b = c = d = 1$

Answer: C

Watch Video Solution

32. If g (f (x)) = lsin xl and f (g(x)) =$\left(\sin\sqrt{x}\right)^2$, then

A. $f(x) = \sin^2 x, g(x) = \sqrt{x}$

B. $f(x) = \sin x, g(x) = |x|$

C. $f(x) = x^2, g(x) = \sin\sqrt{x}$

D. f and g cannot be determined

Answer: A

Watch Video Solution

33. Let $f(x) = \sin x, g(x) = x^2, h(x) = \log_e x$. If F(x) = (hogof) x `then F"(x) is equal to

A. $2\cos ec^3 x$

B. $2\cot x^2 - 4x^2 \cos ec^2 x^2$

C. $2x\cot x^2$

D. $-2\cos ec^2 x$

Answer: D

Watch Video Solution

34. If $f: R \to R$, $g: R \to R$ be two given functions then h(x) = 2 min {f (x) - g(x), 0} equals

A. $f(x) + g(x) - |g(x) - f(x)|$

B. $f(x) + g(x) + |g(x) - f(x)|$

C. $f(x) - g(x) + |g(x) - f(x)|$

D. $f(x) - g(x) - |g(x) - f(x)|$

Answer: D

Watch Video Solution

35. If $f(x) = x^3 - x$ and $\phi(x) = \sin 2x$, then

A. $\phi[f(2)] = \sin 2$

B. $\phi[f(1)] = 1$

C. $f\left[\phi\left(\frac{\pi}{12}\right)\right] = -\frac{3}{8}$

D. $f[f(1)] = 2$

Answer: C

Watch Video Solution

36. If $f(x) = \sin^2 x + \sin^2\left(x + \frac{\pi}{3}\right) + \cos x \cos\left(x + \frac{\pi}{3}\right)$ and g (5/4) = 1, then (gof) x is

A. polynomial of first degree in sin x,cos X

B. a constant function

C. polynomial of 2nd degree in sin x,cos x

D. none

Answer: B

Watch Video Solution

37. If $f(x) = \cos^2 x + \cos^2\left(\frac{\pi}{3} + x\right) - \cos x \cos\left(\frac{\pi}{3} + x\right)$ then f (x) is :

A. odd

B. even

C. periodic

D. $f(0) = f(1)$

Answer: B::C::D

Watch Video Solution

38. Let $f(x) = x^2$ and $g(x) = \sqrt{x}$ then which of the following is correct?

A. gof (4) = 4

B. gof (3)=6

C. gof(-2) = -2

D. gof (2) = 4

Answer: A

Watch Video Solution

39. If $f(x) = 1/(1-x)$ then f f {f (x)}]=

A. 0

B. x

C. $-x$

D. none

Answer: B

Watch Video Solution

40. The inverse of the function $\log_e$ x is

A. 10^x

B. 10^{-x}

C. e^{x}

D. e^{-x}

Answer: C

Watch Video Solution

41. The value of the parameter a for which the function f (x) = 1 + $\alpha x, \alpha \neq 0$ is the inverse of itself, is

A. -2

B. -1

C. 1

D. 2

Answer: B

Watch Video Solution

42. If P and Q are the points of intersection of y=f(x) and y=f^{-1}(x), then

A. P and Q necessarily lie on the line y = x

B. P and Q must be coincident

C. Slope of PQ may be -1

D. None

Answer: C

Watch Video Solution

43. The inverse of the function $y = \frac{10^x - 10^{-x}}{10^x + 10^{-x}} + 1$ is

A. $y = \frac{\log_{10}(x)}{2 - x}$

B. $y = \frac{1}{2}\log_{10}\left(\frac{x}{2 - x}\right)$

C. $y = \frac{1}{2}\frac{\log_{10}(x)}{1 - x}$

D. None of these

Answer: B

Watch Video Solution

44. Suppose $f(x) = (x+1)^2$ for $x \geq -1$. If g(x) is the function whose graph is the reflection of the graph of f (x) with respect to the line y = x, then g(x) equals

A. $-\sqrt{x} - 1x \geq 0$

B. $\frac{1}{(x+1)^2}, x \geq -1$

C. $\sqrt{x+1}, x \geq -1$

D. $\sqrt{x} - 1, x \geq 0$

Answer: D

Watch Video Solution

45. The inverse of the function $f(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}} + 2$ is given by

A. $\frac{1}{2}\frac{\log(x-2)}{x-1}$

B. $\frac{1}{2}\log\frac{x-1}{3-x}$

C. $\frac{1}{2}\log\left(\frac{x}{2-x}\right)$

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

Answer: B

Watch Video Solution

46. Let $f: N\overrightarrow{Y}$ be a function defined as $f(x) = 4x + 3$, where $Y = \{y \in N: y = 4x + 3 \text{ for some } x \in N\}$. Show that f is invertible and its inverse is (1) $g(y) = \frac{3y+4}{3}$ (2) $g(y) = 4 + \frac{y+3}{4}$ (3) $g(y) = \frac{y+3}{4}$ (4) $g(y) = \frac{y-3}{4}$

A. $g(y) = \frac{3y+4}{3}$

B. $g(y) = 4 + \frac{y+3}{4}$

C. $g(y) = \frac{y+3}{4}$

D. $g(y) = \frac{y-3}{4}$

Answer: D

Watch Video Solution

47. The inverse of the function $f(x) = \log_a\left(x + \sqrt{x^2+1}\right)(a \geq 0, a \neq 1)$ is

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

B. not defined for all x

C. defined for xgt0

D. none of these

Answer: A

Watch Video Solution

48. If $f(x) = \sin x + \cos x, g(x) = x^2 - 1,$ then gif (x)) is invertible in domain

A. $\left[\frac{-\pi}{2}, 0\right]$

B. $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$

C. $\left[-\frac{\pi}{2}, \pi\right]$

D. $(0, \pi)$

Answer: B

Watch Video Solution

49. Let $f(x) = (x+1)^2 - 1, (x \geq -1)$ then the set S={x:f (x) = f^{-1} (x)} is

A. $\left\{0, -1, \frac{-3 \pm 2\sqrt{3}}{2}\right\}$

B. $(0, 1, -1)$

C. $\{0, -1\}$

D. empty

Answer: C

Watch Video Solution

50. Let function $f: R \to R$ be defined by f (x) = 2x + sin x for x $\in$ R Then f is

A. one-to-one and onto

B. one-to-one but NOT onto

C. onto but NOT one-to-one

D. neither one-to-one nor onto

Answer: A

Watch Video Solution

51. $f: [0, \infty) \to [0, \infty), f(x) = \frac{x}{1+x}$ is

A. one-one and onto

B. one-one but not onto

C. onto but not one-one

D. neither one-one nor onto

Answer: B

Watch Video Solution

52. Which of the following option is correct

$$f(x) = \begin{cases} 0, \text{when } x \text{ is rational} \\ x, \text{when } x \text{ is irrational} \end{cases}$$

$$g(x) = \begin{cases} x, \text{when } x \text{ is rational} \\ 0, \text{when } x \text{ is irrational} \end{cases}, \text{ then } f - g \text{ is}$$

A. one-one onto

B. one-one not onto

C. not one-one but onto

D. not one-one not onto

Answer: A

Watch Video Solution

53. If the function f :$[1, \infty) \to [1, \infty)$ is defined by $f(x) = 2^{x(x-1)}$, then f^{-1} (x) is

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

B. $\frac{1}{2}\left\{1 + \sqrt{1 + 4\log_2 x}\right\}$

C. $\frac{1}{2}\left\{1 - \sqrt{1 + 4\log_2 x}\right\}$

D. Not defined

Answer: B

Watch Video Solution

54. If $f: [1, \infty) \to [2, \infty)$ is given by $f(x) = x + \frac{1}{x}$ then f^{-1} (x) equals:

A. $\frac{x + \sqrt{x^2 - 4}}{2}$

B. $\frac{x}{1 + x^2}$

C. $\frac{x-\sqrt{x^2-4}}{2}$

D. $1+\sqrt{x^2-4}\Big)$

Answer: A

Watch Video Solution

55. Fundamental period of the function $f(x)=\sin^4 x+\cos^4 x=$

A. π

B. 2π

C. $\pi/2$

D. None

Answer: C

Watch Video Solution

56. Fundamental period of $f(x) = \cos^6 x - \sin^6 x$is equal to

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

B. π

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

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

Answer: B

Watch Video Solution

57. The period of the function f (x)=sin 4x+tan 2x is

A. 2π

B. π

C. $\pi/2$

D. None of these

Answer: C

Watch Video Solution

58. The period of f(x) = 3 $\sin\frac{\pi x}{3} + 4\cos\left(\frac{\pi x}{4}\right)$ is

A. 6

B. 8

C. 24

D. 2π

Answer: C

Watch Video Solution

59. Find the period of following function

$\sin\left(\frac{\pi x}{3}\right) + \sin\left(\frac{\pi x}{4}\right)$

Watch Video Solution

60. Find the period of following function

$\sin x + \cos 2x$

Watch Video Solution

61. If the period of $\frac{\sin nx}{\sin(x/n)}$ be 4π then the value of n, $n \in Z$ (the set of integers) I

A. 2

B. 3

C. 4

D. 5

Answer: A

Watch Video Solution

62. Period of $\cos\left(x^2\right)$ is

A. 2π

B. $4\pi^2$

C. $\pi^2/4$

D. None

Answer: D

Watch Video Solution

63. Let f (x) = cos α x+sin x be periodic. Then α must be

A. rational

B. Prime

C. positive real number

D. none

Answer: A

Watch Video Solution

64. Which one of the following functions are periodic

A. f(x)=x-[x], where[x] denotes GIF

B. f(x)= x sin (1/ x) for x $\neq$ 0,f (0)=0 .

C. f (x) = X COS X

D. none of these

Answer: A

Watch Video Solution

65. The period of the function

f (x) =|sin xl + |cos x| is

A. $\pi/2$

B. π

C. 2π

D. none of these

Answer: A

Watch Video Solution

66. The period of the function $f(x) = \left|\sin\left(\frac{x}{2}\right)\right| + |\cos x| is$

A. π

B. 2π

C. $\pi/2$

D. none

Answer: B

Watch Video Solution

67. The function f (x) = cos x is periodic with period

A. 2π

B. π

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

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

Answer: A

Watch Video Solution

68. Which of the following functions is periodic with period π ?

A. $f(x) = x \cos x$

B. $f(x) = |\cos x|$

C. $f(x) = \sin 3x$

D. $f(x) = [x + \pi]$

Answer: B

Watch Video Solution

69. The period of $f(x) = \left|\cos^5(x/2)\right|$ is

A. π

B. 2π

C. 4π

D. None

Answer: B

Watch Video Solution

70. the period of $f(x) = \frac{1}{2}\left\{\frac{|\sin x|}{\cos x} + \frac{|\cos x|}{\sin x}\right\}$ is

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

B. π

C. 2π

D. None

Answer: C

Watch Video Solution

71. Let $f: R \to Q$ be a continuous function such that f(3) = 10, then

A. f(x) is always an even function

B. f (x) is always an odd function

C. nothing can be said about f (x)being even or odd

D. f (x) is an increasing function

Answer: C

Watch Video Solution

72. The function $F(x) = \int_0^x \log\left(\frac{1-x}{1+x}\right)dx$, is

A. an even function

B. an odd function

C. a periodic function

D. none of these

Answer: A

Watch Video Solution

73. The function $f(x) = \log\left(x + \sqrt{x^1 + 1}\right)$ is

A. an even function

B. an odd function

C. periodic function

D. none of these

Answer: B

Watch Video Solution

74. Determine whether the function $\sin\left\{\log x + \sqrt{\left(x^2+1\right)}\right\}$ is

A. even

B. odd

C. constant

D. none

Answer: B

Watch Video Solution

75. If f and g be two functions, then prove the following:

A. f odd, g odd =(fog) is odd

B. f even, g even =(fog) is even

C. f even, g odd (fog) is even

D. f odd, g even =(fog) is even

Answer: B

Watch Video Solution

76. Classify the following functions for being odd or even:

$$f(x) = x\left(\frac{a^x + 1}{a^x - 1}\right)$$

Watch Video Solution

77. Classify the following functions for being odd or even:

$$f(x) = \sqrt{1 + x + x^2} - \sqrt{1 - x + x^2}$$

Watch Video Solution

78. Classify the following functions for being odd or even:

$f(x) = x^2 - |x|$

Watch Video Solution

79. Classify the following functions for being odd or even:

$$\left[\frac{f(x) - f(-x)}{g(x) + g(-x)}\right]^n$$

Watch Video Solution

80. Classify the following functions for being odd or even:

$$\frac{\sin^4 x + \cos^4 x}{x + x^2 \tan x}$$

Watch Video Solution

81. Classify the following functions for being odd or even:

$$\log\left\{\frac{x^4 + x^2 + 1}{(x^2 + x + 1)}\right\}$$

Watch Video Solution

82. If f (x) is an odd periodic function with period 2, then f (4) equals

A. 0

B. 2

C. 4

D. -4

Answer: A

Watch Video Solution

83. If $\frac{d}{dx}[f(x)] = e^{-x}f(x) + e^{x}f(-x)$then $f(x)$ is (given f (0)=0)

A. even

B. odd

C. neither even nor odd

D. can't say

Answer: B

Watch Video Solution

84. If $f: R \to R$ such that $f(x+y)+f(x-y)=2f(x)f(y)\,\forall x, y \in R$ and $f(0) \neq 0$, then $f(x)$ is an :

A. even function

B. odd function

C. periodic function

D. none

Answer: A

Watch Video Solution

85. If f (x) is a function which is both odd and even then f (3) -f (2) is equal to

A. 1

B. -1

C. 0

D. None

Answer: C

Watch Video Solution

86. f (x) is twice differentiable polynomial function such that f (1) = 1, f (2) = 4, f (3)=9, then

A. $f'(x) = 2,\ \forall x \in R$

B. There exists at least one x $\in$ (1,3) such that f"(x) = 2

C. There exists at least one x $\in$ (2,3) such that f'(x) = 5=f"(x)

D. There exists at least one x $\in$ (1,2) such that f"(x) = 3

Answer: B

Watch Video Solution

87. If f(x) is a differentiable function such that f $R \to R$ and $f\left(\frac{1}{n}\right) = 0 \forall n \geq 1, n \in l,$ then

A. $f(x) = 0 \forall x \in (0, 1]$

B. $f(0) = 0 = f'(0)$

C. $f(0) = 0$ but $f(0)$ may or may not be 0

D. $|f(x)| \leq 1, \forall x \in [0, 1]$

Answer: B

Watch Video Solution

88. If X and Y are two non-empty sets where $f: X \to Y$,is function is defined such that $f(c) = \{f(x): x \in C\}$ for $C \subseteq X$ and $f^{-1}(D) = \{x: f(x) \in D\}$ for $D \subseteq Y$,for any $A \subseteq Y$ and $B \subseteq Y$, then

A. $f^{-1}(f(A)) = A$

B. $f^{-1}(f(A)) = A$ only if f(x) = Y

C. $f\left(f^{-1}(B)\right) = B$ only if $B \subseteq f(x)$

D. $f\left(x^{-1}(B)\right) = B$

Answer: C

Watch Video Solution

89. The largest intervgal lying in $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ for which the function $\left[1f(x) = 4^{-x^2} + \cos^{-1}\left(\frac{x}{2} - 1\right) + \log(\cos x)\right]$ is defined, is :

A. $[0, \pi]$

B. $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

C. $\left[\frac{-\pi}{4}, \frac{\pi}{2}\right)$

D. $\left[0, \frac{\pi}{2}\right)$

Answer: D

Watch Video Solution

90. Are the following functions identical ?

$f(x) = x/x$ and $\phi(x) = 1$

Watch Video Solution

91. Are the following functions identical ?

$f(x) = \log x^2$ and $\phi(x) = 2\log x$

Watch Video Solution

92. Are the following functions identical ?

$f(x) = 1$ and $\phi = \sin^2 x + \cos^2 x$

Watch Video Solution

93. Are the following functions identical ?

$f(x) = x$ and $\phi(x) = \left(\sqrt{x}\right)^2$

Watch Video Solution

94. Are the following functions identical ?

$f(x) = \log(x-2) + \log(x-3)$ and $\phi(x)\log(x-2)(x-3)$

Watch Video Solution

95. The inverse of the function $f(x) = \left[1 - (x-5)^3\right]^{1/5}$ is

$5 + \left(1 - x^5\right)^{1/3}$

Watch Video Solution

96. Let $f(x) = |x+1| + |2^x + 1|$, then f(x) can be rewritten in the form

$$f(x) = \begin{cases} 2^x - x & : x < -1 \\ 2^x + x + 2 & : x \geq -1 \end{cases}$$

Watch Video Solution

97. The derivative of an even function is an odd function whereas the derivative of an odd function is an even function.

Watch Video Solution

98. If $\phi(x) = x^2 + 1$ and $\psi(x) = 3^x$, then $[\psi(x)] =$ ..... And $\psi[\phi(x)] = \ldots.$

Watch Video Solution

99. Classify the following functions for being even or odd:

$x^2 - |x|$

Watch Video Solution

100. Classify the following functions for being even or odd:

$\sin x + \cos x$

Watch Video Solution

101. Classify the following functions for being even or odd:

$$\frac{a^x - a^{-x}}{a^x + a^{-x}}$$

Watch Video Solution

102. Classify the following functions for being even or odd:

$\sin\left[\log\left(x + \sqrt{x^2 + 1}\right)\right]$

Watch Video Solution

103. If f is an even function defined on the interval $(-5, 5)$, then four real values of x satisfying the equation $f(x) = f\left(\frac{x+1}{x+2}\right)$ are _____, _____, _____ and_____.

Watch Video Solution

Problem Set 2

1. Given A= {2,3,4}, B = {2,5, 6, 7). Construct an example of each of the following

an injective mapping from A to B.

Watch Video Solution

2. Given A= {2,3,4}, B = {2,5, 6, 7). Construct an example of each of the following

a mapping from A to B which is not injective.

Watch Video Solution

3. Given A= {2,3,4}, B = {2,5, 6, 7). Construct an example of each of the following

a mapping from B to A.

Watch Video Solution

4. If $A = \{1, 2, 3, 4\}$, then which of the following are functions from A to itself?

A. $f_1 = \{(x, y) : y = x + 1\}$

B. $f_2 = \{(x, y) : x + y > 4\}$

C. $f_3 = \{(x, y) : y < x\}$

D. $f_4 = \{(x, y) : x + y = 5\}$

Answer: D

Watch Video Solution

5. Suppose f is the collection of all ordered pairs of real numbers and x=6 is the first element of some ordered pair in f. Suppose the vertical line through x=6 intersects the graph off twice. Is f a function ? Why or why not?

Watch Video Solution

6. Is g = {(1, 1), (2, 3), (3, 5), (4,7)} a function ? If this is described by the formula $g(x) = \alpha x + \beta$, then what values should be assigned to α and β ?

Watch Video Solution

7. Is the function f:$N \to N$ (N is set of the natural numbers) defined by f(n) = 2n +3 for all $n \in N$ surjective ?

Watch Video Solution

8. Are the following sets of ordered pairs functions? If so, examine whether the mapping is surjective or injective:

{(x, y):x is a person, y is the mother of x}

Watch Video Solution

9. Are the following sets of ordered pairs functions? If so, examine whether the mapping is surjective or injective:

{(a,b): a is a person, b is an ancestor of a}

Watch Video Solution

10. If the mappings f and g are given by f = {(1,2),(3,5),(4, 1)}, g= {(2,3), (5, 1), (1,3)}, then write down pairs in the mappings f o g and go f.

Watch Video Solution

11. If the functions f:$R \to R$and $g: R \to R$ be defined by $f(x) = 2x + 1, g(x) = x^2 - 2$. Find the formulae for g o f and f o g.

Watch Video Solution

12. If R is a set of real numbers and f :$R \to R$ is given by the relation f (x) = sin x, $x \in R$ and mapping g: $R \to R$ by the relation $g(x) = x^2, X \in R$, then prove that $fog \neq gof$.

Watch Video Solution

13. Let $f: R \to R, g: R \to R$ be two functions given by $f(x) = 2x - 3, g(x) = x^3 + 5$. Then $(fog)^{-1}$ is equal to

A. $\left(\frac{x+7}{2}\right)^{1/3}$

B. $\left(x - \frac{7}{2}\right)^{1/3}$

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

D. $\left(\frac{x-7}{2}\right)^{1/3}$

Answer: D

Watch Video Solution

14. If $f(x) = \frac{3x+2}{5x-3}$ then

A. $f^{-1}(x) = f(x)$

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

C. $(fof)(x) = -x$

D. $f^{-1}(x) = -\frac{1}{19}f(x)$

Answer: A

Watch Video Solution

15. Let $f: R \to R$ be defined by f(x) = cos (5x+2). Is f invertible? Justify your answer.

Watch Video Solution

16. A mapping is defined as f:$R \to R$. f (x) = cos x. Show that it is neither one-one nor surjective.

Watch Video Solution

17. Let C be the set of complex numbers. Prove that the mapping f: $C \to R$ given by f (z) =I zI ,z $\in C$ is neither one-one nor onto.

Watch Video Solution

18. Let $A = R - \{3\}, B = R - \{1\}$ and $f: A \to B$ defined by $f(x) = \frac{x-2}{x-3}$. Is 'f' bijective? Give reasons.

Watch Video Solution

19. Let f: $R \to R$ be defined by $f(x) = 3x + 4, X \in R$ Is f invertible ? If so, give a formula for f^{-1}.

Watch Video Solution

20. The composite mapping fog, of the maps f: $R \to R$, f (x)=sin x, g : $R \to R$, g(x) = x^2, is

A. $\sin x + x^2$

B. $(\sin x)^2$

C. $\sin x^2$

D. $\frac{\sin x}{x^2}$

Answer: C

Watch Video Solution

21. Let A and B be two sets with a finite number of elements. Assume that there is injective mapping from A to B and that there is an injective mapping from B to A. Prove that there is a bijective mapping from A to B.

Watch Video Solution

22. If $f: R \to R$ is defined by $f(x) = x^2 + 1$, then values of $f^{-1}(17)$ and $f^{-1}(-3)$ respectively are

Watch Video Solution

23. Which of the statements given below is different from the other?

A. $f: A \to B$

B. $f: x \to f(x)$

C. f is a mapping of A into B

D. f is a function of A into B

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

Watch Video Solution

24. Find the domain and range of $f(x) = x^2 / \left(1 + x^2\right)$(x real). Is the function one-to-one ?

Watch Video Solution

25. If $A = \{x: -1 \leq x \leq 1\} = B$. Discuss the following functions w.r.t. one-one-onto bijective and write their characteristics.

A. $f(x) = \frac{x}{2}$

B. $g(x) = |x|$

C. $h(x) = x|x|$

D. $k(x) = x^2$

Answer:

Watch Video Solution

26. Set A has 3 elements and set B has 4 elements. The number of injections that can be defined from A to B is

A. 144

B. 12

C. 24

D. 64

Answer: C

Watch Video Solution

27. The number of surjections from A={1,2,... n}, $n \geq 2,$ onto B = {a,b} is

A. ${}^{n}P_{2}$

B. $2^{n} - 2$

C. $2^{n} - 1$

D. none of these

Answer: B

Watch Video Solution

28. Let A and B be two finite sets having m and n elements respectively. Then the total number of mappings from A to B is

A. mn

B. 2^{mn}

C. m^{n}

D. n^m

Answer: D

Watch Video Solution

29. The total number of injective mappings from a set with melements to a set with n elements, m $\leq$ n, is

A. m^n

B. n^m

C. $\frac{n!}{(n-m)!}$

D. $n!$

Answer: C

Watch Video Solution

30. Let A be a set containing 10 distinct elements, then the total number of distinct functions from A to A is

A. 101

B. 10^{10}

C. 2^{10}

D. $2^{10} - 1$

Answer: B

Watch Video Solution

31. If the mappings f :$A \to B$and g: $B \to C$ are both bijective, then the mapping gof: A $\to$ C is also bijective.

A. true B. False

Watch Video Solution

32. Let $E = \{1, 2, 3, 4, \}$ and $F = \{1, 2\}$. Then the number of onto functions from E to F, is _____.

A. 14

B. 16

C. 6

D. 4

Answer: A

Watch Video Solution

33. Let A = {0,1} and N the set of all natural numbers. Then the mapping $f: N \to A$ defined by f (2n-1)=0, f (2n) =1 $\forall n \in N$ is many-one onto.

A. True B. False

Watch Video Solution

34. Let f be an injective map with domain {x,y,z) and range {1,2,3} such that exactly one of the following statements is correct and the remaining are false : $f(x) = 1$, $f(y) \neq 1$, $f(z) \neq 2$. The value of f^{-1} (1) is

A. x

B. y

C. z

D. none of these

Answer: B

Watch Video Solution

35. Let R= {(3, 3),(6,6), (9,9), (12, 12),(6, 12),(3,9), (3, 12), (3, 6)} be a relation on the set A={3,6,9,12}. The relation is:

A. an equivalence relation.

B. reflexive and symmetric

C. reflexive and transitive

D. reflexive only

Answer: C

Watch Video Solution

36. If $f:(-1,1) \to B$ be a function defined by $f(x) = \tan^{-1}\left(\frac{2x}{1-x^2}\right)$, then f is both one-one and onto when B is the interval :

A. $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

B. $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

C. $\left[0, \frac{\pi}{2}\right]$

D. $\left[0, \frac{\pi}{2}\right)$

Answer: B

Watch Video Solution

37. Let R = {(1, 3), (4, 2), (2, 4), (2, 3), (3, 1)} be a relation on the set A = {1, 2, 3, 4}. The relation R is

A. function

B. transitive

C. not symmetric

D. reflexive

Answer: C

Watch Video Solution

38. Let R be the real line. Consider the following subsets of the plane $R \times R$. S={(x, y) y = x+1 and $0 < x < 2$} T = {(x, y):x-y is an integer). Which of the following is true ?

A. Neither S nor T is an equivalence relation on R.

B. Both S and T are equivalence relations on R.

C. S is an equivalence relation but T is not

D. T is an equivalence relation but S is not

Answer: D

Watch Video Solution

39. If f: $R \to S$ defined by $f(x) = \sin x - \sqrt{3}\cos x + 1$ is onto, then the interval of S is:

A. $[0, 3]$

B. $[-1, 1]$

C. $[0, 1]$

D. $[-1, 3]$

Answer: D

Watch Video Solution

40. Let W denote the words in the English dictionary. Define the relation R by $R: \{(x, y) \in W \times W$ such that the words x and y have at least one letter in common) Then R is:

A. reflexive, symmetric and not transitive

B. reflexive, symmetric and transitive

C. reflexive, not symmetric and transitive

D. not reflexive, symmetric and transitive

Answer: A

Watch Video Solution

Problem Set 3

1. The domain of the function $f(x) = \sin^{-1} \log_3 \left(\frac{x}{3} \right)$ is

A. $[1, 9]$

B. $[-1, 9]$

C. $[-9, 1]$

D. $[-9, -1]$

Answer: A

Watch Video Solution

2. The domain of the function $f(x) = \sin^{-1}\left(\log_2 \frac{x^2}{2}\right)$ is given by...

A. $[-2, 2]$

B. $[-1, 1]$

C. $[-2, -1] \cup [1, 2]$

D. $[0, 2]$

Answer: C

Watch Video Solution

3. Domain of the function $\sin^{-1}\left(\frac{3}{4+2\sin x}\right)$ is

A. $\left[-\frac{\pi}{6}, \frac{7\pi}{6}\right]$

B. $\left[\frac{\pi}{6}, \frac{5\pi}{6}\right]$

C. $\left[\frac{\pi}{4}, \frac{5\pi}{4}\right]$

D. none

Answer: A

Watch Video Solution

4. The domain of definition of the function $f(x) = \sin^{-1}\left(\frac{4}{3+2\cos x}\right)$, is

A. $\left[-\frac{\pi}{3}, \frac{\pi}{3}\right]$

B. $\left[\frac{\pi}{6}, \frac{2\pi}{3}\right]$

C. $\left[\frac{\pi}{3}, \frac{4\pi}{3}\right]$

D. None

Answer: A

Watch Video Solution

5. The domain of the function $f(x) = \frac{\sin^{-1}(x-3)}{\sqrt{9-x^2}}$, is

A. $[2, 3]$

B. $[2, 3]$

C. $[1, 2]$

D. $[1, 2[$

Answer: B

Watch Video Solution

6. The domain off (x) = $\sqrt{(\cos(\sin x)]} + \sin^{-1}\left(\frac{x^2+1}{2x}\right) =$

A. $R - \{1\}$

B. $\{-1, 1\}$

C. $(1, \infty)$

D. none of these

Answer: B

Watch Video Solution

7. If f(x) $= \sqrt{[\cos(\sin x)]} + \sin^{-1}\left(\frac{x^2+1}{2x}\right) + \frac{1}{1-x}$ then the domain of x is

A. $\{-1, 1\}$

B. $(1, \infty)$

C. $R - \{1\}$

D. $\{-1\}$

Answer: D

Watch Video Solution

8. If $f(x) = \cos^{-1}\left(\frac{2-|x|}{4}\right) + [\log_{10}(3-x)]^{-1}$, then its domain is

A. $[-2, 6]$

B. $[-6, 2) \cup (2, 3)$

C. $[-6, 2]$

D. $(-2, 2) \cup [2, 3]$

Answer: B

Watch Video Solution

9. If $y = \sin^{-1}\left[\frac{x-1}{x+1}\right] + \log(2-x)$, then its domain is :

A. $(1, 2)$

B. $(-1, 2)$

C. $[0, 2)$

D. None

Answer: C

Watch Video Solution

10. The domain of definition of the function,` f (x) = (1 - 3x)^(1//3) + 3 cos^(-1) ((2x -1)/(3))+3^(3 tan^(-1))x* is

A. $\left[-\frac{1}{3}, \frac{1}{3}\right]$

B. $[1, 2]$

C. $\left[-1, \frac{1}{3}\right]$

D. None

Answer: C

View Text Solution

11. The function $f(x) = \cot^{-1}\left(\sqrt{(x+3)x}\right) + \cos^{-1}\left(\sqrt{x^2+3x+1}\right)$ is defined for x equal to

A. 0

B. -3

C. $\{0, -3\}$

D. None

Answer: C

Watch Video Solution

12. The function $f(x) = \frac{\sec^{-1} x}{\sqrt{x - [x]}}$ where [x] denotes the greatest integer less than or equal to x is defined for all x belonging to

A. R

B. $R - \{(-1, 1) \cup \{n : n \in Z\}$

C. $R^+ - (0, 1)$

D. $R^+ - \{n : n \in N\}$

Answer: B

Watch Video Solution

13. If $y = 2^{-x} + \cos^{-1}\left(\frac{x}{2} - 1\right) + \log\sqrt{x - [x]}$, then its domain is given by

A. $(0, 4) - \{1\}$

B. $(0, 4) - \{1, 2\}$

C. $(0, 4) - \{1, 2, 3\}$

D. None

Answer: C

Watch Video Solution

14. If $y = \frac{\sqrt{x^2 - 4}}{\cos^{-1}(2 - x)}$ then the domain of y is

A. $[2, 4]$

B. $[1, 2]$

C. $[2, 3]$

D. $[-2, 2]$

Answer: C

Watch Video Solution

15. The domain of the function $f(x) = -\frac{\sqrt{4 - x^2}}{\sin^{-1}(2 - x)}$ is

A. $(0, 2)$

B. $[0, 2]$

C. $[1, 2]$

D. $[1, 3]$

Answer: C

Watch Video Solution

16. The domain of definition of the function $f(x) = \sin^{-1}((x-3)/(2)) - \log(4-x)$ is

A. $1 \leq x \leq 5$

B. $1 < x < 4$

C. $1 \leq x \leq 4$

D. $1 \leq x < 4$

Answer: D

Watch Video Solution

17. The domain of the function $f(x) = \sqrt{3 - 2^x - 2^{1-x}} + \sqrt{\sin^{-1} x}$ is

A. $(0, 1)$

B. $[0, 1]$

C. $(0, 1]$

D. None of these

Answer: B

Watch Video Solution

18. $\sqrt{\sin^{-1}(\log_2 x)}$ exists for

A. $x \in [1, 2)$

B. $x \in [1, 2]$

C. $x \in [2, \infty)$

D. $x \in (0, \infty)$

Answer: B

Watch Video Solution

19. The natural domain of, $\sqrt{\sin^{-1}(2x) + \frac{\pi}{6}}$ for all $x \in R$, is

A. $\left[-\frac{1}{4}, \frac{1}{2}\right]$

B. $\left[-\frac{1}{4}, \frac{1}{4}\right]$

C. $\left[-\frac{1}{2}, \frac{1}{2}\right]$

D. $\left[-\frac{1}{2}, \frac{1}{4}\right]$

Answer: A

Watch Video Solution

20. The domain of definition of the function y (x) given by the equation

$2^x + 2^y = 2$is

A. $0 < x < 1$

B. $0 \leq x \leq 1$

C. $-\infty < x \leq 0$

D. $-\infty < x < 1$

Answer: D

Watch Video Solution

21. Domain of $\cos^{-1}\left[2x^2 - 3\right]$, where $[*]$ denotes the greatest integer function, is equal to

A. $\left[1, \sqrt{\frac{5}{2}}\right]$

B. $\left[-\sqrt{\frac{5}{2}}, -1\right]$

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

D. $\left[-\sqrt{\frac{5}{2}}, -1\right] \cup \left[1, 5\sqrt{\frac{1}{2}}\right]$

Answer: C

Watch Video Solution

22. The domain of the function $f(x) = \sqrt{(2 - 2x - x^2)}$ is

A. $-3 \leq x \leq \sqrt{3}$

B. $-1 - \sqrt{3} \leq x \leq -1 + \sqrt{3}$

C. $-2 \leq x < 2$

D. None of these

Answer: B

Watch Video Solution

23. $f(x) = \sqrt{\left[\frac{(x+1)(x-3)}{(x-2)}\right]}$ is a real valued function in the domain

A. $]-\infty, -1] \cup [3, \infty[$

B. $]-\infty, -1] \cup]2, 3]$

C. $[-1, +2] \cup [3, \infty[$

D. None of these

Answer: C

Watch Video Solution

24. The domain of the function

$\sqrt{x^2 - 5x + 6} + \sqrt{2x + 8 - x^2}$ is

A. $[2, 3]$

B. $[-2, 4]$

C. $[-2, 2] \cup [3, 4]$

D. $[-2, 1] \cup [2, 4]$

Answer: C

Watch Video Solution

25. The domain of the real valued function $\sqrt{(x+2)(5-x)} - \frac{1}{\sqrt{x^2-4}}$ is

A. $[1, 2] \cup [2, 5]$

B. $(2, 5]$

C. $[3, 4]$

D. $[3, 5]$

Answer: B

Watch Video Solution

26. The domain of definition of $f(x) = \sqrt{\frac{1-|x|}{2-|x|}}$ is

A. $(-\infty, \infty) - [-2, 2]$

B. $(-\infty, \infty) - [-1, 1]$

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

D. none of these

Answer: C

Watch Video Solution

27. The domain of definition of the function

$f(x) = \frac{1}{\sqrt{|x| - x}}$ is

A. R

B. $(0, \infty)$

C. $(-\infty, 0)$

D. none of these

Answer: C

Watch Video Solution

28. Given $f(x) = \frac{1}{\sqrt{(|x| - x)}}, g(x) = \frac{1}{\sqrt{(x - |x|)}}$ then

A. f(x) has some domain and g(x) has no domain

B. f(x) has no domain and g(x) has some domain

C. f (x) and g(x) have the same domain .

D. f (x) and g(x) do not have any domain

Answer: A

Watch Video Solution

29. The domain of the function $f(x) = \sqrt{x - \sqrt{1 - x^2}}$ is

A. $\left[-1, -\frac{1}{\sqrt{2}}\right] \cup \left[\frac{1}{\sqrt{2}}, 1\right]$

B. $\left[\frac{1}{\sqrt{2}, 1}\right]$

C. $\left(-\infty, \frac{1}{2}\right] \cup \left[\frac{1}{2}, \infty\right)$

D. $[-1, 1]$

Answer: A

Watch Video Solution

30. The domain of the function $\sqrt{x^2 - [x]^2}$, where [x] has the usual meaning, is

A. any +ive number

B. any-ive number

C. any +ive number or -ive integer

D. none

Answer: C

Watch Video Solution

31. The domain of the function

$f(x) = \sqrt[6]{4^x + 8^{2/3(x-2)} - 52 - 2^{2(x-1)}}$ is

A. $(0, 1)$

B. $[3, \infty)$

C. $(1, 0)$

D. None of these

Answer: B

Watch Video Solution

32. The domain of the derivative of the function

"JPN_MLK_OBJ_MAT_V02_C25_E03_032_Q01.png"

A. $R - \{0\}$

B. $R - \{1\}$

C. $R - \{-1\}$

D. $R - \{-1, 1\}$

Answer: C

View Text Solution

33. The domain of definition of

$\log_4 \log_5 \log_3 (18x - x^2 - 77)$ is given by

A. $(3, 5)$

B. $(7, 11)$

C. $(8, 10)$

D. None of these

Answer: C

Watch Video Solution

34. The domain of the function $\log_{10} \log_{10}$ (1 + x^3) `is

A. $(0, \infty)$

B. $[o, \infty)$

C. $(-1, \infty)$

D. $(-1, 0)$

Answer: A

Watch Video Solution

35. The domain of the function $y = f(x) = \frac{1}{\log_{10}(1-x)} + \sqrt{x+2}$ is

A. $]-3, -2.5[\cup]-2.5-2[$

B. $[-2, 0[\cup]0, 1[$

C. $]0, 1[$

D. none of these

Answer: B

Watch Video Solution

36. Domain of definition of the functioni $f(x) = \frac{3}{4 - x^2} + \log_{10}(x^3 - x)$, is:

A. $(1, 2)$

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

C. $(1, 2) \bigcup (2, \infty)$

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

Answer: D

Watch Video Solution

37. The domain of $f(x) = \frac{\log_2(x + 3)}{x^2 + 3x + 2}$ is

A. $R - \{-1, -2\}$

B. $(-2, \infty)$

C. $R - \{-1, -2, -3\}$

D. $(-3, \infty) - \{-1, -2\}$

Answer: D

Watch Video Solution

38. The domain of the function $f(x) = \sqrt{\left\{\frac{-\log_{0.3}(x-1)}{-x^2+3x+18}\right\}}$ is

A. $[2, 6]$

B. $]2, 6[$

C. $[2, 6[$

D. None of these

Answer: C

Watch Video Solution

39. The domain of definition of the function $f(x) = \sin \log\left\{\frac{\sqrt{(4-x^2)}}{1-x}\right)$ is

A. $[-2, 1-1]$

B. $]-2, 1[$

C. $[-2, 0]$

D. None

Answer: B

Watch Video Solution

40. The domain of definition of the real function $f(x) = \sqrt{(\log_{16} x^2)}$ of the real variable x is

A. $x > 0$

B. $|x| \geq 1$

C. $|x| \geq 4$

D. $x \geq 4$

Answer: B

Watch Video Solution

41. The domain of the function $f(x) = \sqrt{[\log(1/|\sin x|)]}$ is

A. $R - \{2n\pi, n \in Z\}$

B. $R - \{n\pi, n \in Z\}$

C. $R - \{-\pi, \pi\}$

D. None of these

Answer: B

Watch Video Solution

42. Cosider $f(x) = 1 - e^{\frac{1}{x}-1}$

Q. If D is the set of all real x such that $f(x) \geq 0$ then D is equal to

A. $(-\infty, 1)$

B. $(-\infty, 0)$

C. $(1, \infty)$

D. $(-\infty, 0) \cup (1, \infty)$

Answer: D

Watch Video Solution

43. The domain of definition of the function

$f(x) = \sqrt{\log_{10}\left(\frac{5x - x^2}{4}\right)}$ is

A. $[1, 4]$

B. $(1, 4)$

C. $(0, 5)$

D. $[0, 5]$

Answer: A

Watch Video Solution

44. The domain of the function $f(x) = \sqrt{\log_{0.4}(x - x^2)}$ is

A. $(1, 2)$

B. $(0, 1)$

C. $\left(0, \frac{1}{2}\right)$

D. None of these

Answer: B

Watch Video Solution

45. The domain of function $\sqrt{\log_{0.75} x}$ is

A. $(0, \infty)$

B. $[0.75, 1]$

C. $(0, 1]$

D. $[0, 1)$

Answer: C

Watch Video Solution

46. The domain of $\log_{x^2+x-2}\left[x + \frac{1}{2}\right]$ is

A. $(0, \infty)$

B. $(1, \infty)$

C. $(1, \infty)$

D. $(1, \infty) - \left\{\frac{-1+\sqrt{13}}{2}\right\}$

Answer: D

Watch Video Solution

47. The domain of definition of $f(x) = \log\left\{(\log x)^2 - 5\log x + 6\right\}$ is equal to

A. $(0, 10^2)$

B. $(10^3, \infty)$

C. $(10^2, 10^3)$

D. $(0, 10^2) \cup (10^3, \infty)$

Answer: D

Watch Video Solution

48. The domain of $\sqrt{\log_{x^2-1}(x)}$ is

A. $(\sqrt{2}, \infty)$

B. $(0, \infty)$

C. $(1, \infty)$

D. None

Answer: A

Watch Video Solution

49. The domain of the real valued function $\log_{[x+1/2]}\left|x^2 - x - 2\right|$ is

A. $\left[\frac{3}{2}, 2\right) U(2, \infty)$

B. $\left[\frac{3}{2}, \infty\right) - \{2\}$

C. $\left[\frac{1}{2}, \infty\right) - \{2\}$

D. None

Answer: A::B

Watch Video Solution

50. The set of all x for which there are no functions $f(x) = \log_{\frac{x-2}{x+3}} 2$ and $g(x) = \frac{1}{\sqrt{x^2 - 9}}$

A. $[-3, 2]$

B. $[-3, 2)$

C. $(-3, 2]$

D. $(-3, 2)$

Answer: A

Watch Video Solution

51. If $f(x) = \log_{x^2} 36$ and $g(x) = \log_x 6$, then f (x) = g(x) holds for x belonging to

A. R

B. ϕ

C. $(0, \infty) - \{1\}$

D. None

Answer: C

Watch Video Solution

52. The range of the function $f(x) = \frac{1}{2 - \sin 3x}$ =

A. $\left]\frac{1}{3}, 1\right[$

B. [1/3,1]

C. $[1/3, 1[$

D. None

Answer: B

Watch Video Solution

53. The domain and range of the function $f(x) = {}^{7-x}P_{x-3}$ are ..... and .....

domain

A. $[3.4]$

B. $[4, 5]$

C. $[3, 4, 5]$

D. None

Answer: C

Watch Video Solution

54. The range of the function $f(x) = {}^{7-x}P_{x-3}$ are .....

A. $[1, 2]$

B. $[2, 3]$

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

D. None

Answer: C

Watch Video Solution

55. The range of the function $f(x) = \sqrt{x^2+4x C_{2x^2+3}}$ are ____

A. $\{1, 2\sqrt{3}\}$

B. $[1, 2]$

C. $[1, 3]$

D. None

Answer: A

Watch Video Solution

56. The domain of the function $f(x) = \sqrt{x^2+4x C_{2x^2+3}}$ are

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

B. $[1, 2]$

C. $[\sqrt{3}, 2]$

D. None

Answer: A

Watch Video Solution

57. The domain of the function $f(x) = {}^{16-x}C_{2x-1} + {}^{20-3x}P_{4x-5}$, where the symbols have their usual meanings, is the set

A. $\{2, 3\}$

B. $\{2, 3, 4\}$

C. $\{2, 3, 4, 5\}$

D. None

Answer: A

Watch Video Solution

58. The range of the function $y = \frac{x}{1+x^2}$ is

A. $\left[-\frac{1}{2}, \frac{1}{2}\right]$

B. $\left[-\frac{1}{2}, \frac{1}{2}\right]$

C. $\left[-\frac{1}{2}, \frac{1}{2}\right]$

D. $\left[-\frac{1}{2}, \frac{1}{2}\right]$

Answer: D

Watch Video Solution

59. Range of $f(x) = \frac{x^2+x+2}{x^2+x+1} - \infty < x < \infty,$ is

A. $[1, \infty]$

B. $[1, \infty)$

C. $\left[1, \frac{7}{5}\right)$

D. $\left(1, \frac{7}{3}\right]$

Answer: D

Watch Video Solution

60. Let f be a real valued function defined by $f(x) = \frac{e^x - e^{-|x|}}{e^x + e^{|x|}}$, then the range of $f(x)$ is: R (b) $[0, 1]$ (c) $[0, 1)$ (d) $\left[0, \frac{1}{2}\right)$

A. R

B. $[0, 1]$

C. $[0, 1)$

D. $[0, 1/2)$

Answer: D

Watch Video Solution

61. The range of the function $y = \dfrac{x-1}{x^2-3x+3}$ is

A. $(0, \infty)$

B. $(-\infty, \infty)$

C. $[0, 1]$

D. $[1/3, 1] - \{0\}$

Answer: D

View Text Solution

62. If $f(x) = \dfrac{1+\sqrt{-1}\cos x}{1-\sqrt{-1}\sin x}$ then its range is ____

A. 1

B. 2

C. $\sqrt{2}$

D. None

Answer: A

View Text Solution

63. If $b^2 - 4ac = 0, a > 0$ then the domain of the function $f(x) = \log\left(ax^3 + (a+b)x^2 + (b+c)x + c\right)$ is :

A. $R \sim \left\{ -\frac{b}{2a} \right\}$

B. $R \sim \left\{ \left\{ -\frac{b}{2a} \right\} \cup \{x : x \geq -1\} \right\}$

C. $R \sim \left\{ \left\{ -\frac{b}{2a} \right\} \cap (-\infty, -1] \right\}$

D. None of these

Answer: C

Watch Video Solution

64. The domain of definition of the function $f(x) = \log\left|4 - x^2\right|$ is R-{2,-2}.

Watch Video Solution

65. If $f_1(x)$ and $f_2(x)$are defined on domains D_1 and D_2 respectively, then $f_1(x) + f_2(x)$ is defined on $D_1 \cup D_2$.

Watch Video Solution

66. The domain of definition of the function $f(x) = \log_x e$is .....

Watch Video Solution

67. The domain and range (Range = f (x): x $\in$ domain off) of the function $f(x) = \frac{x^2 - 3x + 2}{x^2 + x - 6}$are

Watch Video Solution

68. Find the domain of $f(x) = \sqrt{\sin x} + \sqrt{16 - x^2}$

Watch Video Solution

69. The domain and range of the function $f(x) = \frac{x^2}{(1+x^2)}$ are ..... and ..... respectively.

Watch Video Solution

70. Given $A = \left\{x : \frac{\pi}{6} \leq x \leq \frac{\pi}{3}\right\}$ and $f(x) = \cos x - x(1+x)$. Find $f(A)$.

Watch Video Solution

71. If the function f and g are defined from the set of real numbers R to R such that $f(x) = e^x, g(x) = 3x - 2$ then find functions fog and gof. Also find the domains of functions $(fog)^{-1}$ and $(gof)^{-1}$.

Watch Video Solution

Problem Set 4

1. The function f (x)=1/x on its domain is

A. increasing

B. decreasing

C. constant

D. information insufficient

Answer: B

Watch Video Solution

2. Let $y = x^2 e^{-x}$ then the interval in which y increases with respect to x is

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

B. $(-2, 0)$

C. $(2, \infty)$

D. $(0, 2)$

Answer: D

Watch Video Solution

3. If $f(x) = e^{1-x}$ then f(x) is

A. increasing on $\left[-\frac{1}{2}, 1\right]$

B. decreasing on R

C. increasing on R

D. decreasing on $\left[-\frac{1}{2}, 1\right]$

Answer: A

Watch Video Solution

4. The function $f(x) = \tan^{-1}(\sin x + \cos x)$ is an increasing function in :

A. $\left(\frac{\pi}{4}, \frac{\pi}{2}\right)$

B. $\left(-\frac{\pi}{2}, \frac{\pi}{4}\right)$

C. $\left(0, \frac{\pi}{2}\right)$

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

Answer: B

Watch Video Solution

5. If $f(x) = \int_{x^2}^{x^2+1} e^{-t^2}$, the interval in which f (x) is increasing is

A. $(0, \infty)$

B. $(-\infty, 0)$

C. $[-2, 2]$

D. no where

Answer: B

Watch Video Solution

6. If the function $f(x) = \frac{a\sin x + 2\cos x}{\sin x + \cos x}$ is increasing for all values of x, then

A. $a > 1$

B. $a > 1$

C. $a < 2$

D. $a > 2$

Answer: D

Watch Video Solution

7. The interval of increase of the function $f(x) = x - e^x + \tan\left(\frac{2\pi}{7}\right)$ is equal to

A. $(0, \infty)$

B. $(-\infty, 0)$

C. $(1, \infty)$

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

Answer: B::D

Watch Video Solution

8. The function $f(x) = \cot^{-1} x + x$ increases in the interval

A. $(1, \infty)$

B. $(-1, \infty)$

C. $(-\infty, \infty)$

D. $(0, \infty)$

Answer: C

Watch Video Solution

9. The function $f(x) = x^x$ decreases on the interval

A. $(0, e)$

B. $(0, 1)$

C. $(0, 1/e)$

D. none of these

Answer: C

Watch Video Solution

10. The function f(x) = $\frac{x}{\log x}$ increases on the interval

A. $(0, \infty)$

B. $(0, e)$

C. (e, ∞)

D. none of these

Answer: C

Watch Video Solution

11. The function $f(x) = \frac{\log x}{x}$ is increasing in the interval

A. $(1, 2e)$

B. $(0, e)$

C. $(2, 2e)$

D. $(1/e, 2e)$

Answer: B

Watch Video Solution

12. The function $f(x) = \frac{x}{4 + x^2}$ decreases in the interval

A. $(1, 2)$

B. $(0, e)$

C. $(-\infty, 2)$ U $(2, \infty)$

D. $(1/e, 2e)$

Answer: C

Watch Video Solution

13. The function f (x) =tan x-x

A. always increases

B. always decreases

C. never decreases

D. sometimes increases and sometimes decreases

Answer: A

Watch Video Solution

14. If $\alpha < 0$, the function $\left(e^{\alpha x} + e^{-\alpha x}\right)$ is a monotonic decreasing function for all values of x, where

A. $x > 0$

B. $x < 0$

C. $x > 1$

D. $x < 1$

Answer: B

Watch Video Solution

15. The value of b for which the function $f(x) = \sin x - bx + c$is decreasing in the interval $(-\infty, \infty)$ is given by

A. $b < 1$

B. $b \geq 1$

C. $b > 1$

D. $b \leq 1$

Answer: C

Watch Video Solution

16. The value of a for which the function $f(x) = \sin x - \cos x - ax + b$ decreases for all real values of x is given by

A. $a \geq \sqrt{2}$

B. $a \geq 1$

C. $a < \sqrt{2}$

D. $a < 1$

Answer: A

Watch Video Solution

17. $y = \sin x - a\sin 2x - \frac{1}{3}\sin 3x + 2ax,$ then y increases for all values of x if

A. $a = 1$

B. $a > 1$

C. $a < 0$

D. $0 < a < 1$

Answer: B

Watch Video Solution

18. The set of values of a 'for which the function f (x) $= x^2 + ax + 1$ is an increasing function on [1,2] is

A. $(- \infty, - 4)$

B. $[- 4, \infty)$

C. $[4, \infty)$

D. $(-\infty, 4)$

Answer: B

Watch Video Solution

19. The length of a longest interval in which the function $3\sin x - 4\sin^3 x$ is increasing, is

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

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

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

D. π

Answer: A

Watch Video Solution

20. If $f(x) = 2x + \cot^{-1} x + \log\left(\sqrt{1+x^2} - x\right)$ then f(x)

A. increases in $[0, \infty)$

B. decreases in $[0, -\infty)$

C. neither increases nor decreases in $(0, \infty)$

D. increases in $(-\infty, \infty)$

Answer: A::D

Watch Video Solution

21. Let $h(x) = f(x) - (f(x))^2 + (f(x))^3$ for every real number x: Then

A. h is increasing whenever f is increasing

B. h is increasing whenever f is decreasing

C. h is decreasing whenever f is decreasing

D. nothing can be said in general.

Answer: A::C

Watch Video Solution

22. If $f(x) = x^3 + bx^2 + cx + d$ and $0 < b^2 < c$, then in $(-\infty, \infty)$, $f(x)$

A. is increasing

B. has local maxima

C. is decreasing

D. is bounded

Answer: A

Watch Video Solution

23. The function $f(x) = 2\log(x-2) - x^2 + 4x + 1$ increases on the interval

A. $(1, 2)$

B. $(2, 3)$

C. $(5/2, 3)$

D. $(2, 4)$

Answer: B::C

Watch Video Solution

24. On which of the following intervals is the function $f(x) = 2x^2 - \log|x|, x \neq 0$ increasing ?

A. $\left(\frac{1}{2}, \infty\right)$

B. $\left(-\infty, -\frac{1}{2}\right) \cup \left(\frac{1}{2}, \infty\right)$

C. $\left(-\infty, -\frac{1}{2}\right) \cup \left(0, \frac{1}{2}\right)$

D. $\left(-\frac{1}{2}, 0\right) \cup \left(\frac{1}{2}, \infty\right)$

Answer: A::D

Watch Video Solution

25. $y = \left[x(x-3)^2\right]$ increases for all values of x lying in the interval

A. $0 < x < 1$

B. $0 < x < \infty$

C. $-\infty < x < 0$

D. $1 < x < 3$

Answer: A::C

Watch Video Solution

26. Let $f(x) = \int e^x (x-1)(x-2)dx$. Then f decreases in the interval

A. $(-\infty, -2)$

B. $(-2, -1)$

C. $(1, 2)$

D. $(2, \infty)$

Answer: C

Watch Video Solution

27. Let $f(x) = x^3 + ax^2 + bx + 5\sin^2 x$ be an increasing function on the set R. Then a and b satisfy

A. $a^2 - 3b - 15 > 0$

B. $a^2 - 3b + 15 > 0$

C. $a^2 - 3b + 15 < 0$

D. $a > 0$ and $b > 0$

Answer: C

Watch Video Solution

28. If $f(x) = \frac{\lambda^2 - 1}{\lambda^2 + 1}x^3 - 3x + 5$ is a decreasing function of λ (independent of x) is

A. $[-1, 1]$

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

C. $(1, \infty)$

D. None

Answer: A

Watch Video Solution

29. Let $f(x) = x^3 + 6x^2 + px + 2$. If the largest possible interval in which f (x) is a decreasing function in (-3,-1) then p is equal to :

A. 2

B. 6

C. 8

D. 9

Answer: D

Watch Video Solution

30. If $\frac{x^2}{f(4a)} + \frac{y^2}{f(a^2-5)}$ represents an ellipse with major axis as Y-axis and f is a decreasing function,then $a \in$

A. $(1, 4)$

B. $(-1, 1)$

C. $(-1, 5)$

D. $(5, \infty)$

Answer: C

Watch Video Solution

31. The function $f(x) = \log_e\left(x^3 + \sqrt{x^6 + 1}\right)$ is of the following types

A. even

B. odd

C. increasing

D. decreasing

Answer: B::C

Watch Video Solution

32. The function $f(x) = \cos\left(\frac{\pi}{x}\right)$ is decreasing in the interval

A. $[2n + 1, 2n), n \in N$

B. $\left]\frac{1}{2n+1}, 2n\right[, n \in N$

C. $\left]\frac{1}{2n+2}, \frac{1}{2n+1}\right[n \in N$

D. none of these

Answer: C

Watch Video Solution

33. The function $f(x) = \sin^4 x + \cos^4 x$ increases if

A. $0 < x < \pi/8$

B. $\pi/4 < x < 3\pi/8$

C. $3\pi/8 < x < 5\pi/8$

D. $5\pi/8 < x < 3\pi/4$

Answer: B

Watch Video Solution

34. Let f (x) = $\begin{cases} x^3 - x^2 + 10x - 5 & , \quad x \leq 1 \\ -2x + \log_2(b^2 - 2) & , \quad x > 1 \end{cases}$ the set of values of b for which f(x) has greatest value at x = 1 is given by

A. $1 \leq b \leq 2$

B. $b = \{1, 2\}$

C. $b \in (-\infty, -1)$

D. none of these

Answer: D

Watch Video Solution

35. The set of all x for which $\log(1 + x) \leq x$ is

A. $(0, \infty)$

B. $(-1, \infty)$

C. $(-1, 0)$

D. None of these

Answer: B

Watch Video Solution

36. For all $x \in (0, 1)$

A. $e^x < 1 + x$

B. $\log_e(1 + x) < x$

C. $\sin x > x$

D. $\log_e x > x$

Answer: B

Watch Video Solution

37. $f(x) = \frac{x}{\sin x}$ and $g(x) = \frac{x}{\tan x}$, where $0 < x \leq 1$ then in the interval

A. Both f (x) and g(x) are increasing functions.

B. Both f (x) and g(x) are decreasing functions.

C. f(x) is an increasing function.

D. g(x) is an increasing function

Answer: C

Watch Video Solution

38. A function is matched below against an interval where it is supposed to be increasing. Which of the following pairs is incorrectly matched

	Interval	Function f (x)
(a)	$\left]-\infty, \frac{1}{3}\right]$	$3x^2 - 2x + 1$
(b)	$]-\infty, -4]$	$x^3 + 6x^2 + 6$
(c)	$]-\infty, \infty[$	$x^3 - 3x^2 + 3x + 3$
(d)	$[2, \infty[$	$2x^3 - 3x^2 - 12x + 6$

Watch Video Solution

39. The function $f(x) = \frac{\log(\pi + x)}{\log(e + x)}$ is a decreasing function in the interval $]0, \infty[$. Is this statement true or false?

Watch Video Solution

40. The function $y = \frac{x}{x^2 - 6x - 16}$ is a decreasing function in R-{-2,8}. Is this statement true ?

Watch Video Solution

41. The function $y = \sin^{-1}$ (1+x) increases in $-2 < x < 0$. Is it true?

Watch Video Solution

42. The larger of log (1 + x) and $\frac{\tan^{-1} x}{1 + x}$ when x>0 is .....

Watch Video Solution

43. Find the interval of monotonicity of $y = \frac{1 - x + x^2}{1 + x + x^2}$

Watch Video Solution

Miscellaneous Exercise Matching Entries

1. Match the following Column I to Column II

Column-I		Column-II	
(a)	$y = \frac{10}{4x^3 - 9x^2 + 6x}$ decreasing	(p)	$(-\infty, 0)$
(b)	$y = 2x^2 - \log x$ increasing	(q)	$\left(0, \frac{1}{2}\right)$
(c)	$y = x - 2\sin x$ decreasing	(r)	$(2, \infty)$
(d)	$y = x^2 e^{-x}$ decreasing	(s)	$(0, 2)$

Watch Video Solution

2. Match the following Column I to Column II

Let $f(x) = \log \frac{1+x}{1-x}$ and $g(x) = \frac{3x + x^3}{1 + 3x^2}$ then

Column-I		Column-II	
(a)	$(fog)\left(\frac{1-e}{1+e}\right)$	(p)	3
(b)	$(gof)\left(\frac{e-1}{e+1}\right)$	(q)	-3
(c)	(fog)	(r)	0
(d)	$(fog)\left(\frac{e-1}{e+1}\right)$	(s)	1

Watch Video Solution

3. Match the following Column I to Column II

Column-I	Column-II
(a) $f(x) = \{x\}$ where $\{x\}$ = fractional part of x	(p) $f^{-1}(x) = \frac{1}{2}(4^x - 4^{-x})$
(b) $f(x) = \frac{16^x - 1}{4^x}$	(q) f is an even function
(c) $f(x) = \log_4 \{x + \sqrt{x^2 + 1}\}$	(r) f is periodic
(d) $f(x) = x\frac{3^x - 1}{3^x + 1}$	(s) f is an odd function

Watch Video Solution

4.

Column-I	Column-II
(a) The set $\left[\mathrm{Re}\left(\frac{2iz}{1-z^2}\right) : z \in C, \lvert z\rvert = 1, z \neq \pm 1\right]$ is	(p) $]-\infty, -1[\cup]1, \infty[$
(b) The domain of the function $f(x) = \sin^{-1}\left(\frac{\theta(3)^{x-2}}{1-3^{2(x-1)}}\right)$ is	(q) $]-\infty, 0[\cup]0, \infty[$
(c) If $f(\theta) = \begin{vmatrix} 1 & \tan\theta & 1 \\ -\tan\theta & 1 & \tan\theta \\ -1 & -\tan\theta & 1 \end{vmatrix}$ then the set $\left\{f(\theta) : 0 \le \theta \le \frac{\pi}{2}\right]$ is	(r) $[2, \infty[$
(d) If $f(x) = x^{3/2}(3x - 10), x \ge 0$ then $f(x)$ is increasing in	(s) $]-\infty, -1] \cup [1, \infty[$
	(t) $]-\infty, 0] \cup [2, \infty[$

View Text Solution

Assertion Reason

1. Let $f(x) = \frac{\sin^{-1}(x-3)}{2} - \log_{10}(4-x)$

Statement 1. the domain of $f(x)$ is [1,3]

statement 2. $\sin^{-1}$ x is defined for $|x| \leq 1$ and $\log_{10} x$ is defined for $x > 0$

Watch Video Solution

Comprehension

1. . Which of the following is true ? (A) g is increasing on (1,) (B) g is decreasing on (1,) (C) g is increasing on (1, 2) and decreasing on (2,) (D) g is decreasing on (1, 2) and increasing on (2,)

A. g is increasing on $[1, \infty[$

B. g is decreasing on $]1, \infty[$

C. g I increasing on $]1, 2[$ and decreasing on $]2, \infty[$

D. g Is decreasing on $]1, 2[$ and increasing on $]2, \infty[$

Answer: B

Watch Video Solution

2. Let $f(x) = (1-x)^2 \sin^2 x + x^2 \forall \times \in R$ and Let $g(x) = \int_1^x \left(\frac{2(t-1)}{t+1} - \log t \right) f(t) dt \forall x \in [1, \infty[$

consider the statement :

There exisits some $x \in R$ such that $f(x) + 2x = \left(1 + x^2\right)$

Watch Video Solution

3. Consider the statements : P : There exists some x IR such that f(x) + 2x = 2(1+x2) Q : There exists some x IR such that 2f(x) +1 = 2x(1+x) Then (A) both P and Q are true (B) P is true and Q is false (C) P is false and Q is true (D) both P and Q are false.

A. both P and Q are true

B. P is false and Q is false

C. P is False and Q is true

D. Both P and Q are false

Answer: C

Watch Video Solution

Self Assessment Test

1. If f (x + ay , x - ay) = axy , then f(x,y) is equal to

A. xy

B. $x^2 + a^2y^2$

C. $\frac{x^2 - y^2}{4}$

D. none of these

Answer: C

Watch Video Solution

2. A functions from the set of natural numbers to integers defined by

$$f(n)=\begin{cases}\dfrac{n-1}{2}, & \text{when } n \text{ is odd}\\ -\dfrac{n}{2}, & \text{when } n \text{ is even}\end{cases}, \text{ is}$$

A. one-one but not onto

B. onto but not one-one

C. one-one and onto both

D. none of these

Answer: C

Watch Video Solution

3. The domain of $\sin^{-1}\left[\log_3\left(\frac{x}{3}\right)\right]$ is

A. $[1, 9]$

B. $[-1, 9]$

C. $[3, +9]$

D. None of these

Answer: A

Watch Video Solution

4. The function $f(x) = \log\left(x + \sqrt{x^1 + 1}\right)$ is

A. an even function

B. an odd function

C. a periodic function

D. none of these

Answer: B

Watch Video Solution

5. Let $g(x) = 1 + x - [x]$ and $f(x) = \begin{cases} -1, & x < 0 \\ 0, & x = 0 \\ 1, & x > 0 \end{cases}$, then for all x, $f[g(x)]$ is equal to

A. x

B. 1

C. $f(x)$

D. $g(x)$

Answer: B

Watch Video Solution

6. If $f(x) = (a - x^n)^{1/n}$ where $a > 0$ and $n \in N$, then $f[f(x)]$ is equal to :

A. x^3

B. x^2

C. x

D. None of these

Answer: C

Watch Video Solution

7. Let f be a real-valued function on the interval (-1,1) such that $e^{-x}f(x) = 2 + \int_0^x \sqrt{t^4+1}, dt, \forall x \in (-1, 1)$ and let f^{-1} be the inverse function of f. Then $\left[f^{-1}(2)\right]$ is a equal to:

A. 1

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

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

D. $= e$

Answer: B

Watch Video Solution

8. Let $f(x) = x^2 and g(x) = \sin x f$ or $all x \in R$. Then the set of all x satisfying $(fogogof)(x) = (gogof)(x), where (fog)(x) = f(g(x)),$ is

$\pm\sqrt{n\pi}, n \in \{0, 1, 2, .\}$ $\pm\sqrt{n\pi}, n \in \{1, 2, .\}$

$\frac{\pi}{2} + 2n\pi, n \in \{, -2, -1, 0, 1, 2\}$ $2n\pi, n \in \{, -2, -1, 0, 1, 2, \}$

A. $\pm\sqrt{n\pi}, n \in \{0, 1, 2, \ldots. \}$

B. $\pm\sqrt{n\pi}, n \in \{1, 2, \ldots \}$

C. $\pm\frac{\pi}{2} + 2n\pi, n \in \{\ldots 2, -1, 0, 1, 2, \ldots\}$

D. $2n\pi, n \in \{\ldots. -2, -1, 0, 1, 2, \ldots \}$

Answer: A

Watch Video Solution

9. The function $f: [0, 3] \to [1, 29]$, defined by $f(x) = 2x^3 - 15x^2 + 36x + 1$ is

A. one-one and onto

B. onto but not one-one

C. one-one but not onto

D. neither one-one nor onto

Answer: B

Watch Video Solution

10. The real number k for which the equation $2x^3 + 3x + k = 0$ has two distinct real roots in [0, 1]

A. lies between 1 and 2

B. lies between 2 and 3

C. lies between - 1 and 0

D. does not exist

Answer: D

Watch Video Solution