MATHS

BOOKS - SHRI BALAJI MATHS (ENGLISH)

FUNCTION

Single Choice Problems

1. Range of the function $f(x) = \log_{\sqrt{2}}\left(2 - \log_2\left(16\sin^2 x + 1\right)\right)$ is:

A. $[0, 1]$

B. $(-\infty, 2]$

C. $[-1, 1]$

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

Answer: B

Watch Video Solution

2. The values of α and β for which $\left|e^{|x-\beta|}-\alpha\right|=2$ has four distinct solutions are

A. $a \in (-2, \infty), b=0$

B. $a \in (2, \infty), b=0$

C. $a \in (3, \infty), b \in R$

D. $a \in (2, \infty) b=0$

Answer: C

Watch Video Solution

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

A. $(-\pi/2, \pi/2)$

B. $[-\pi/2, \pi/2] - \{0\}$

C. $[-\pi/2, \pi/2]$

D. $(-3\pi/4, 3\pi/4)$

Answer: C

Watch Video Solution

4. Find the number of real ordered pair(s) (x, y) for which: $16^{x^2+y} + 16^{x+y^2} = 1$

A. 0

B. 1

C. 2

D. 3

Answer: B

Watch Video Solution

5. The conplete range of vlaues of 'a' such that $\left(\frac{1}{2}\right)^{|x|} = x^2 - a$ is satisfied for maximum number of values of x is:

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

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

C. $(-1, 1)$

D. $(-1, \infty)$

Answer: D

Watch Video Solution

6. For a real number x, let [x] denote the greatest integer less than or equal to x. Let f: R $\rightarrow$ R be defined as $f(x) = 2x + [x] + \sin x \cos x$ then f is

A. One-one but not onto

B. onto but not one-one

C. Both one-one and onto

D. Neither one-one nor onto

Answer: A

Watch Video Solution

7. The maximum value of $\sec^{-1}\left(\frac{7-5\left(x^2+3\right)}{2\left(x^2+2\right)}\right)$ is:

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

B. $\frac{5\pi}{12}$

C. $\frac{7\pi}{12}$

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

Answer: D

Watch Video Solution

8. Number of ordered pair (a,b) the set $A = \{1, 2, 3, 4, 5\}$ so that the functon $f(x) = \frac{x^3}{3} + \frac{a}{2}x^2 + bx + 10$ is an injective mapping $\forall x \in R$:

A. `13

B. 14

C. 15

D. 16

Answer: C

Watch Video Solution

9. let A be the greatest value of the function $f(x) = \log_x [x]$, (where $[.]$ denotes gratest integer function) and B be the least value of the function $g(x) = |\sin x| + |\cos x|$, then :

A. $A > B$

B. $A < B$

C. $A = B$

D. $2A + B = 4$

Answer: C

Watch Video Solution

10. The function $f: (a, \infty) \to R$ where R denotes the range corresponding to the given domain, with rule $f(x) = 2x^3 - 3x^2 + 6$, will have an inverse provided

A. $a = 1, B = [5, \infty)$

B. $a = 2, B = [10, \infty)$

C. $a, 0, B = [6, \infty)$

D. $a = -1, B = [1, \infty)$

Answer: A

Watch Video Solution

11. Solution of the inequation $\{x\}(\{x\}-1)(\{x\}+2)\geq 0$

where $\{.\}$ denots fractin part function) is :

A. $x\in(-2,1)$

B. $x\in I$ (I denote set of integers)

C. $x\in[0,1)$

D. $x\in[-2,0)$

Answer: B

Watch Video Solution

12. Let $f(x), g(x)$ be two real valued functions then the function $h(x)=2\max\{f(x)-g(x),0\}$ is equal to :

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: C

Watch Video Solution

13. Let $R = \{(1, 3), (4, 2), (2, 4), (2, 3), (3, 1)\}$ be a relation the set $A = \{1, 2, 3, 4\}$. The relation R is (a). a function (b). reflexive (c). not symmetric (d). transitive

A. a function

B. reflexive

C. not symmetric

D. transitive

Answer: C

Watch Video Solution

14. The true set of valued of 'K' for which $\sin^{-1}\left(\frac{1}{1+\sin^2 x}\right) = \frac{k\pi}{6}$ may have a solution is :

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

B. $[1, 2]$

C. $\left[\frac{1}{6}, \frac{1}{2}\right]$

D. $[2, 4]$

Answer: B

Watch Video Solution

15. A real valued function f(x) satisfies the functional equation $f(x-y) = f(x)f(y) - f(a-x)f(a+y)$, where a is a given constant and f(0)=1 , f(2a-x) =?

A. $-f(x)$

B. $f(x)$

C. $f(a) + f(a - x)$

D. $f(- x)$

Answer: A

Watch Video Solution

16. Let $g: R \to R$ be given by $g(x) = 3 + 4x$ if $g^n(x) =$ gogogo......og (x) n times. Then inverse of $g^n(x)$ is equal to :

A. $(x + 1 - 4^n). 4^{-n}$

B. $(x - 1 + 4^n)4^{-n}$

C. $(x + 1 + 4^n)4^{-n}$

D. None of these

Answer: A

Watch Video Solution

17. Let $f: D \to R$ bge defined as : $f(x) = \frac{x^2+2x+a}{x^2+4x+3a}$ where D and R denote the domain of f and the set of all the real numbers respectively. If f is surjective mapping. Then the complete range of a is :

A. $0 < a \leq 1$

B. $0 < a \leq 1$

C. $0 \leq a < 1$

D. $0 < a < 1$

Answer: D

Watch Video Solution

18. Let $f: (-\infty, 2] \to (-\infty, 4]$ be a function defined by $f(x) = 4x - x^2$. Then, $f^{-1}(x)$ is

A. $2 - \sqrt{4-x}$

B. $2+\sqrt{4-x}$

C. $-2+\sqrt{4-x}$

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

Answer: A

Watch Video Solution

19. IF $\{5\sin x]+[\cos x]+6=0,$ then range of $f(x)=\sqrt{3}\cos x+\sin$ x corresponding to solution set of the given equation is: (where $[.]$ denotes greatest integer function)

A. $[-2,-1]$

B. $\left(-\frac{3\sqrt{3}+2}{5},-1\right)$

C. $[-2,-\sqrt{3})$

D. $\left(-\frac{3\sqrt{3}+4}{5},-1\right)$

Answer: D

Watch Video Solution

20. If $f : R \to R$ where $f(x) = ax + \cos x$ is an invertible function, then $(a).\ (-2, -1] \cup [1, 2)$; $(b).\ [-1, 1]$; $(c).\ (-\infty, -1] \cup [1, \infty)$; $(d).\ (-\infty, -2] \cup [2, \infty)$.

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

B. $[-1, 1]$

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

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

Answer: C

Watch Video Solution

21. The range of function $f(x) = [1 + \sin x] + \left[2 + \sin\frac{x}{2}\right] + \left[3 + \sin\frac{x}{3}\right] + \ldots + \left[n + \sin\frac{x}{n}\right] \forall x$ denotes greatest integer function) is :

A. $\left\{\frac{n^2+n-2}{2}, \frac{n(n+1)}{2}\right\}$

B. $\left\{\frac{n(n+1)}{2}\right\}$

C. $\left\{\frac{n(n+1)}{2}, \frac{n^2+n+2}{2}, \frac{n^2+n+4}{2}\right\}$

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

Answer: D

Watch Video Solution

22. Find the number of values of $f(x) = \left[\frac{x}{15}\right]\left[-\frac{15}{x}\right]$ can take where $x \in (0, 90)$ where [.] =GIF

A. 5

B. 6

C. 7

D. Infinite

Answer: B

Watch Video Solution

23. Which of the following function is homogeneous ?

A. $f(x) = x \sin y + y \sin x$

B. $g(x) = xz\frac{y}{x} + ye\frac{x}{y}$

C. $h(x) = \frac{xy}{x + y^2}$

D. $\phi(x) = \frac{x - y \cos x}{y \sin x + y}$

Answer: B

Watch Video Solution

24. Let $f(x) = \begin{bmatrix} 2x + 3 & x > 1 \\ \alpha^2 x + 1 & x \leq 1 \end{bmatrix}$ If range of $f(x) = R$ (set of real numbers) then number orf integral value(s), which α any take :

A. 2

B. 3

C. 4

D. 5

Answer: C

Watch Video Solution

25. The maximum integral values of x in the domain of $f(x) = \log_{10}\left(\log_{1/3}(\log_4(x-5)\right)$ is : (a). 5 (b). 7 (c). 8 (d). 9

A. 5

B. 7

C. 8

D. 9

Answer: C

Watch Video Solution

26. Range of the function f(x)=$\log_2\left(\sqrt{x-2}+\sqrt{4-x}\right)$ is

A. $(0, \infty)$

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

C. $[1, 2]$

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

Answer: B

Watch Video Solution

27. Number of integers stastifying the equation $\left|x^2+5x\right|+\left|x-x^2\right|=|6x|$ is:

A. 3

B. 5

C. 7

D. 9

Answer: C

Watch Video Solution

28. Which of the following is not an odd function ?

A. ln $\left(\frac{x^4+x^2+1}{(x^2+x+1)^2}\right)$

B. sgn (sgn(x))

C. sin (tan x)

D. $f(x)$, where

$$f(x)+f\left(\frac{1}{x}\right)=f(x)f\left(\frac{1}{x}\right)\forall x\in R-\{0\} \text{ and } f(2)=33$$

Answer: D

Watch Video Solution

29. Which of the following function is periodic with fundamental period π ?

A. $f(x) = \cos x\left|\frac{\sin x}{2}\right|$, where [.] denotes greatest integer function

B. $g(x) = \frac{\sin x + \sin 7x}{\cos x + \cos 7x} + |\sin x|$

C. $h(x) = \{x\} + |\cos x|$, where {.} denotes functional part function

D. $\phi(x) = |\cos x| + \ln(\sin x)$

Answer: B

Watch Video Solution

30. Let $f: N \rightarrow Z$ and $f(x) = \begin{bmatrix} \frac{x-1}{2} & \text{when x is odd} \\ -\frac{x}{2} & \text{when x is even} \end{bmatrix}$, then:

(a). f (x) is bijective (b).f (x) is injective but not surjective (c).f (x) is not injective but surjective (d).f (x) is neither injective nor subjective

A. f (x) is bijective

B. f (x) is injective but not surjective

C. f (x) is not injective but surjective

D. f (x) is neither injective nor subjective

Answer: A

Watch Video Solution

31. Let $g(x)$ be the inverse of $f(x)=\dfrac{2^{x+1}-2^{1-x}}{2^{x}+2^{-x}}$ then g (x) be :

A. $\frac{1}{2}\log_2\left(\frac{2+x}{2-x}\right)$

B. $-\frac{1}{2}\log_2\left(\frac{2+x}{2-x}\right)$

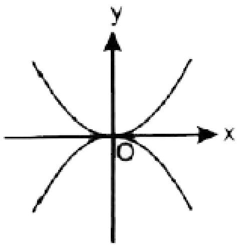
C. $\log_2\left(\frac{2+x}{2-x}\right)$

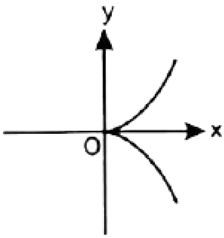
D. $\log_2\left(\frac{2-x}{2+x}\right)$

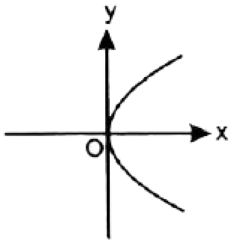
Answer: C

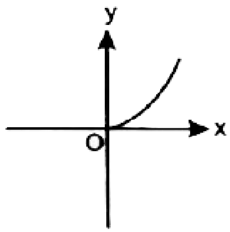
Watch Video Solution

32. Which of the following is the graph of the curve $\sqrt{|y|}=x$ is ?

A. 

B. 

C. 

D. 

Answer: B

Watch Video Solution

33. Domain of $f(x) = \log_{(x)}(9 - x^2)$ is :

A. $\{1, 2\}$

B. $(-\infty, 2)$

C. $(-\infty, \log_2 5]$

D. $[\log)_2 5, 3]$

Answer: C

Watch Video Solution

34. if $e^x + e^{f(x)} = e$ then for $f(x)$

A. Domain is $(-\infty, 1)$

B. Range is $(-\infty, 1]$

C. Domain is $(-\infty, 0]$

D. Range is $(-\infty, 0]$

Answer: A

Watch Video Solution

35. A lion moves in the region given by the graph $y - |y| - x + |x| = 0.$ curve a person can move so that he does not encounter lion -

A. $y = x^2$

B. $y = sgn(-e^2)$

C. $y = \log_{1/3} x$

D. $y = -(m + |x|), m > 3$

Answer: D

Watch Video Solution

36. If $|f(x) + 6 - x^2| = |f(x)| + |4 - x^2| + 2,$ then f(x) is necessarily non-negaive for

A. $x \in [-2, 2]$

B. $xn(-\infty, -2) \cup (2, \infty)$

C. $x \in [-\sqrt{6}, \sqrt{6}]$

D. $x \in [-5, -2] \cup [2, 5]$

Answer: A

Watch Video Solution

37. Let $f(x) = \cos(px) + \sin x$ be periodic, then p must be : a) Positive real number b) Negative real number c) Rational d) Prime

A. Positive real number

B. Negative real number

C. Rational

D. Prime

Answer: C

Watch Video Solution

38. The domain of $f(x) is (0, 1)$ .Then the domain of $(f(e^x) + f(1n|x|)$ is

$(a)(- 1, e)$ (b) $(1, e)$ (c) $(- e, \; - 1)$ (d)$(- e, 1)$

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

B. $(- e, 1)$

C. $\left(- 1, \; - \frac{1}{e}\right)$

D. $(- e, \; - 1) \cup (1, e)$

Answer: B

Watch Video Solution

39. Let $A = \{1, 2, 3, 4\}$ and $f: A \rightarrow$ A satisfy $f(1) = 2, f(2) = 3, f(3) = 4, f(4) = 1.$ Suppose $g: A \rightarrow A$ satisfies $g(1) = 3$ and $fog = gof,$ then g =

A. $\{(1, 3), (2, 1), (3, 2), (4, 4)\}$

B. $\{(1, 3), (2, 4), (3, 1), (4, 2)\}$

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

D. $\{(1, 3), (2, 4), (3, 2), (4, 1)\}$

Answer: B

Watch Video Solution

40. Number of solutions of the equation, $[y + [y]] = 2\cos x$ is: (where $y = 1/3)[\sin x + [\sin x + [\sin x]]]$ and $[] =$ greatest integer function) 0 (b) 1 (c) 2 (d) ∞

A. 0

B. 1

C. 2

D. Infinite

Answer: A

Watch Video Solution

41. The function $f(x) = \left\{ \frac{(x^{2n})}{(x^{2n} sgn x)^{2n+1}} \left(\frac{e^{\frac{1}{x}} - e^{-\frac{1}{x}}}{e^{\frac{1}{x}} + e^{-\frac{1}{x}}} \right) x \neq 0 n \in N \right.$ is:

A. Odd function

B. Even function

C. Neither odd nor even function

D. Constant function

Answer: B

Watch Video Solution

42. $f(1) = 1 \text{ and } f(n) = 2\sum_{r=1}^{n-1} f(r)$. Then $\sum_{n=1}^{m} f(n)$ is equal to

(A)$3^m - 1$

(B)3^{m}

(C)3^{m-1}

(D)none of these

A. 3 ^(m) -1

B. 3^{m}

C. 3^{m-1}

D. $no \neq ofthese$

Answer: C

Watch Video Solution

43. Let $f(x)=\frac{x}{\sqrt{1+x^{2}}}$ then ubrace(fo fo fo ......of)(x) ` is :

A. $\frac{x}{\sqrt{1+\left(\sum_{r=1}^{n} r\right)x^{2}}}$

B. $\frac{x}{\sqrt{1+\left(\sum_{r=1}^{n} 1\right)x^{2}}}$

C. $\left(\frac{x}{\sqrt{1+x^{2}}}\right)^{n}$

D. $\frac{n\pi}{\sqrt{1+\pi x^2}}$

Answer: B

Watch Video Solution

44. Let $f: R \to R,$ then $f(x) = 2x + |\cos x|$ is:

(a).One-one into (b).One-one and onto

(c).May-one and into (d).Many-one and onto

A. One-one into

B. One-one and onto

C. May-one and into

D. Many-one and onto

Answer: B

Watch Video Solution

45. Let $f: R \to R$ be a function defined by $f(x) = x^3 + x^2 + 3x + \sin x$.

Then f is

A. One-one end into

B. One-one and onto

C. Many-one and into

D. many-one and onto

Answer: B

Watch Video Solution

46. If $f(x) = \{x\} + \{x+1\} + \{x+2\} \ldots\ldots\ldots \{x+99)$, then the value of $[f(\sqrt{2})]$ is, where (.) denotes fractional part function & [.] denotes the greatest integer function

A. 5050

B. 4950

C. 41

D. 14

Answer: C

Watch Video Solution

47. If $|\cot x + \cos ecx| = |\cot x| + |\cos ecx|, x \in [0, 2\pi]$, then complete set of values of x is :

A. $[0, \pi]$

B. $\left(0, \frac{\pi}{2}\right]$

C. $\left(0, \frac{\pi}{2}\right] \cup \left[\frac{3\pi}{2}, 2\pi\right)$

D. $\left(\pi, \frac{3\pi}{2}\right] \cup \left[\frac{7\pi}{4}, 2\pi\right]$

Answer: C

Watch Video Solution

48. The funcrtin $f(x)=0$ has eight distinvt real solution and f also satisfy $f(4+x)=f(4-x)$. The sum of all the eight solution of $f(x)=0$ is :

A. 12

B. 32

C. 16

D. 15

Answer: B

Watch Video Solution

49. Let f(x) polynomial of degree 5 with leading coefficient unity such that f(1)=5, f(2)=4,f(3)=3,f(4)=2,f(5)=1, then f(6) is equal to

A. 0

B. 24

C. 120

D. 720

Answer: C

Watch Video Solution

50. Let $f: A \to B$ be a function such that $f(x) = \sqrt{x-2} + \sqrt{4-x,}$ is invertible, then which of the following is not possible ?

A. $A = [3, 4]$

B. $A = [2, 3]$

C. $A = \left[2, 2\sqrt{3}\right]$

D. $\left\{2, 2\sqrt{2}\right]$

Answer: C

Watch Video Solution

51. Find the number of positive integral values of x satisfying $\left[\frac{x}{9}\right]=\left[\frac{x}{11}\right]$ is where [.] -=Gl.F) (a). 21 (b). 22 (c). 23 (d). 24

A. 21

B. 22

C. 23

D. 24

Answer: D

Watch Video Solution

52. The domain of function $f(x)=\log_{\left[x+\frac{1}{2}\right]}\left(2x^2+x-1\right)$, where $[.]$ denotes the greatest integer function is :

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

B. $(2, \infty)$

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

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

Answer: A

Watch Video Solution

53. The solution set of the equation $[x]^2 + [x+1] - 3 = 0,$ where $[.]$ represents greatest integeral function is :

A. $[-1, o) \cup [1, 2)$

B. $[-2, -1) \cup [1, 2)$

C. $[1, 2]$

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

Answer: B

Watch Video Solution

54. Which among the following relations is a function ?

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

B. $\frac{x^2}{a^2} + \frac{y^2}{b^2} = r^2$

C. $y^2 = 4ax$

D. $x^2 = dxy$

Answer: D

Watch Video Solution

55. A function $f: R \rightarrow R$ is defined as $f(x) = 3x^2 + 1$. then $f^{-1}(x)$ is :

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

B. $\left(\frac{1}{2}\sqrt{x} - 1\right.$

C. f^{-1} does not exist

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

Answer: C

Watch Video Solution

56. If $f(x) = \begin{cases} 2+x, & x \geq 0 \\ 4-x, & x < 0 \end{cases}$, then $f(f(x))$ is given by :

A. $f(f(x)) = \begin{cases} 4+x, & x \geq 0 \\ 6-x, & x < 0 \end{cases}$

B. $f(f(x)) = \begin{cases} 4+x, & x \geq 0 \\ x, & x < 0 \end{cases}$

C. $f(f(x)) = \begin{cases} 4-x, & x \geq 0 \\ x, & x < 0 \end{cases}$

D. $f(f(x)) = \begin{cases} 4-x, & x \geq 0 \\ x+2x, & x < 0 \end{cases}$

Answer: A

Watch Video Solution

57. The function $f: R \rightarrow R$ defined as $f(x) = \dfrac{3x^2+3x-4}{3+3x-4x^2}$ is :

A. One ot one buty not onto

B. Onto but not one to one

C. Both one to one and onto

D. Neither one to one nor onto

Answer: B

Watch Video Solution

58. The number of solutions of the equation $e^x - \log(x) = 0$ is :

A. 0

B. 1

C. 2

D. 5

Answer: B

Watch Video Solution

59. If complete solution set of $e^{-x} \leq 4 - x$ is $[\alpha, \beta]$ then $[\alpha] + [\beta]$ is equal to : (where [.] denotes greatest integer function)

A. 0

B. 2

C. 1

D. 4

Answer: C

Watch Video Solution

60. Range of $f(x) = \sqrt{\sin(\log_7(\cos(\sin x)))}$ is:

A. $[0, 1]$

B. $\{0, 1\}$

C. $\{0\}$

D. $[1, 7]$

Answer: C

Watch Video Solution

61. If domain of $y = f(x)$ is $x \in [-3, 2]$, then domain of $y = f(| \ | x] |)$:

(where[.] denotes greatest integer function)

A. $[-3, 2]$

B. $[-2, 3]$

C. $[-3, 3]$

D. $[-2, 3]$

Answer: B

Watch Video Solution

62. Range of the function $f(x) = \cot^{-1}\{-x\} + \sin^{-1}\{x\} + \cos^{-1}\{x\}$, where {.} denotes fractional part function:

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

B. $\left[\frac{3\pi}{4}, \pi\right)$

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

D. $\left(\frac{3\pi}{4}, \pi\right]$

Answer: D

Watch Video Solution

63. Let $f: R - \left\{\frac{3}{2}\right\} \to R,\ f(x) = \frac{3x+5}{2x-3}. Let f_1(x) = f(x),\ f_n(x) = f(f_{n-1}(x)$

for $\pi \geq 2,\ n \in N,$ then $f_{2008}(x) + f_{2009}(x) =$

A. $\frac{2x^2+5}{2x-3}$

B. $\dfrac{x^2 + 5}{2x - 3}$

C. $\dfrac{2x^2 - 5}{2x - 3}$

D. $\dfrac{x^2 - 5}{2x - 3}$

Answer: A

Watch Video Solution

64. Find the range of the function $f(x) = \dfrac{(1 + x + x^2)(1 + x^4)}{x^3}$

A. $[0, \infty]$

B. $[2, \infty]$

C. $[4, \infty]$

D. $[6, \infty]$

Answer: D

Watch Video Solution

65. The function $f:(-\infty, -1)\overrightarrow{0, e^5}$ defined by $f(x) = e^x$ ^ $(3 - 3x + 2)$ is many one and onto many one and into one-one and onto one-one and into

A. Many one and onto

B. Many one and into

C. One to one and onto

D. One to one and into

Answer: A

Watch Video Solution

66. If $f(x) = \sin(\log)_e\left\{\frac{\sqrt{4 - x^2}}{1 - x}\right\}$, then the domain of $f(x)$ is _____ and its range is ________.

A. $[-1, 1]$

B. $[0, 1]$

C. $[-1, 1)$

D. None of these

Answer: A

Watch Video Solution

67. Set of values of 'a' for which the function $f: R \rightarrow R$, given by $f(x) = x^3 + (a+2)x^2 + 3ax + 10$ is one-one is given by :

A. $(-\infty, 1] \cup [4, \infty)$

B. $[1, 4]$

C. $[1, \infty]$

D. $[-\infty, 4]$

Answer: B

Watch Video Solution

68. If the range of the function $F(x) = \tan^{-1}(3x^2 + bx + c)$ is $\left[0, \frac{\pi}{2}\right)$; (domain in R) then :

A. $b^2 = 3c$

B. $b^2 = 4c$

C. $b^2 = 12c$

D. $b^2 = 8c$

Answer: C

Watch Video Solution

69. Let $f(x) = \sin^{-1} x - \cos^{-1}$ x, then the set of values of k for which of $|f(x)| = k$ has exactly two distinct solutions is :

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

B. $\left(0, \frac{\pi}{2}\right]$

C. $\left[\frac{\pi}{2}, \frac{3\pi}{2}\right)$

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

Answer: A

Watch Video Solution

70. Let $f: R \to R$ is defined by $f(x) = \begin{cases} (x+1)^3 & x \le 1 \\ \ln x + (b^2 - 3b + 10) & x > 1 \end{cases}$ If f (x) is invertible, then the set of all values of 'b' is :

A. $\{1, 2\}$

B. ϕ

C. $\{2, 5\}$

D. None of these

Answer: A

Watch Video Solution

71. If f(x) is continuous such that $|f(x)| \leq 1, \forall x \in R$ and $g(x) = \frac{e^{f(x)} - e^{-|f(x)|}}{e^{f(x)} + e^{-|f(x)|}}$, then range of g(x) is

A. $[0, 1]$

B. $\left[0, \frac{e^2+1}{e^2-1}\right]$

C. $\left[0, \frac{e^2-1}{e^2+1}\right]$

D. $\left[\frac{e^2+1}{e^2+1}, 0\right]$

Answer: D

Watch Video Solution

72. Consider all function $f: \{1, 2, 3, 4\} \to \{1, 2, 3, 4\}$ which are one-one, onto and satisfy the following property :

If $f(k)$ is odd then $f(k+1)$ is even,$K = 1, 2, 3.$ The number of such function is :

A. 4

B. 8

C. 12

D. 16

Answer: C

Watch Video Solution

73. Consider the function $f: R - \{1\} \to R - \{2\}$ given by $f\{x\} = \frac{2x}{x-1}$. Then

A. f is one-one but not onto

B. f is onto but not one-one

C. f is neither one-one nor onto

D. f is one-one and onto

Answer: D

Watch Video Solution

74. If rang of fraction $f(x)$ whose domain is set of all real numbers is $[-2, 4]$, then range of function$g(x) = \frac{1}{2}f(2x+1)$ is equal to :

A. $[-2, 4]$

B. $[-1, 2]$

C. $[-3, 9]$

D. $[-2, 2]$

Answer: B

Watch Video Solution

75. Let $f: R \rightarrow$ and $f(x) = \frac{x(x^4+1)(x+1)+x^4+2}{x^2+x+1}$, then $f(x)$ is :

A. one-one, inot

B. Many -one onto

C. One-one, onto

D. Mny one, into

Answer: D

Watch Video Solution

76. Let f (x) be defined as

$$f(x) = \begin{cases} |x| & 0 \leq x < 1 \\ |x-1| + |x-2| & 1 \leq x < 2 \\ |x-3| & 2 \leq x < 3 \end{cases}$$

The range of function $g(x) = \sin(7(f(x))$ is :

A. $[0, 1]$

B. $[-1, 0]$

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

D. $[-1, 1]$

Answer: D

Watch Video Solution

77. If $[x]^2 - 7[x] + 10 < 0$ and $4[y]^2 - 16[y] + 7 < 0$, then $[x+y]$ cannot be ([.]` denotes greatest integer function):

A. 7

B. 8

C. 9

D. both (b) and (c)

Answer: C

Watch Video Solution

78. Let $f: R \rightarrow R$ be a function defined by $f(x) = \frac{e^{|x|} - e^{-x}}{e^x + e^{-x}}$. Then, f is a bijection (b) f is an injection only (c) f is surjection on only (d) f is neither an injection nor a surjection

A. f (x) is many one, onto function

B. f (x) is many one, into function

C. f (x) is decreasing function $\forall n \in R$

D. $f(x)$ is bijective function

Answer: B

Watch Video Solution

79. The function $f(x)$ satisfy the equation $f(1-x)+2f(x)=3x\,\forall x \in R,$ then $f(0)=$

A. -2

B. -1

C. 0

D. 1

Answer: B

Watch Video Solution

80. Let $f:[0,5] \rightarrow [0,5)$ be an invertible function defined by $f(x) = ax^2 + bx + C$, where $a, b, c \in R, abc \neq 0$, then one of the root of the equation $cx^2 + bx + a = 0$ is:

A. a

B. b

C. c

D. $a + b + c$

Answer: A

Watch Video Solution

81. Let $f(x) = x^2, \lambda x + \mu \cos x, \lambda$ being an integer and μ us a real number. The number of ordered pairs (λ, μ) for which the equation $f(x) = 0$ and $f(f(x)) = 0$ have the same (non empty) set of real roots is:

A. 2

B. 3

C. 1

D. 6

Answer: C

Watch Video Solution

82. Consider all function $f: \{1, 2, 3, 4\} \rightarrow \{1, 2, 3, 4\}$ which are one-one, onto and satisfy the following property :

If $f(k)$ is odd then $f(k+1)$ is even,$K = 1, 2, 3.$ The number of such function is :

A. 4

B. 8

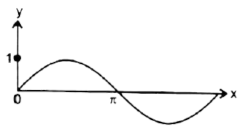
C. 12

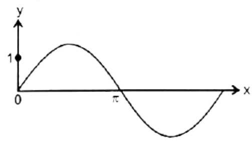
D. 16

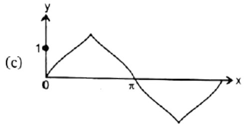
Answer: C

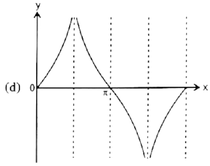
Watch Video Solution

83. Which of the following is closest to the graph of $y = \tan(\sin x), x > 0$?

A. 

B. 

C. 

D. 

Answer: B

Watch Video Solution

84. Consider the function $f: R-\{1\} \rightarrow R-\{2\}$ given by $f(x)=\frac{2x}{x-1}$ Then :

A. f is one-one but not onto

B. f is onto but not one-one

C. f is one-one nor onto

D. f is both one-one and onto

Answer: D

Watch Video Solution

85. If rangr of funtion $f(x)$ whose domain is set of all real numbers is $[-2, 4]$, then range of function $g(x) = \frac{1}{2}f(2x+1)$ is equal to

A. $[-2, 4]$

B. $[-1, .2]$

C. $[-3, 9]$

D. $[-2, 2]$

Answer: B

Watch Video Solution

86. Let $f: R \rightarrow$ and $f(x) = \frac{x(x^4+1)(x+1)+x^4+2}{x^2+x+1}$, then $f(x)$ is :

A. One-one, into

B. Many one, onto

C. One-one, onto

D. Many one, into

Answer: D

Watch Video Solution

87. Let f (x) be defined as

$$f(x)=\begin{cases}|x| & 0\le x<1\\ |x-1|+|x-2| & 1\le x<2\\ |x-3| & 2\le x<3\end{cases}$$

The range of function $g(x)=\sin(7(f(x))$ is :

A. $[0, 1]$

B. $[-1, 0]$

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

D. $[-1, 1]$

Answer: D

Watch Video Solution

88. Number of integral values of x in the domain of function $f(x) = \sqrt{\ln(|\ln|x| \, |)} + \sqrt{7|x| - (|x|)^2 - 10}$ is equal to

A. 5

B. 6

C. 7

D. 8

Answer: B

Watch Video Solution

89. The number of integral ordered pair (x,y) that satisfy the system of equatin $|x + y - 4| = 5$ and $|x - 3| + |y - 1| = 5$ is/are:

A. 2

B. 4

C. 6

D. 12

Answer: D

Watch Video Solution

90. $f: R \to R$, where $f(x) = \frac{x^2 + ax + 1}{x^2 + x + 1}$ Complete set of values of 'a' such that $f(x)$ is onto, is

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

B. $(-\infty, 0)$

C. $(0, \infty)$

D. Empty set

Answer: D

Watch Video Solution

91. If A={1,2,3,4} and f : A->A, then total number of invertible functions,'f',such that $f(2) \neq 2$,$f(4) \neq 4$,$f(1) = 1$ is equal to:

A. 1

B. 2

C. 3

D. 4

Answer: C

Watch Video Solution

92. The domian of definition of $f(x) = \log_{(x^2 - x + 1)}(2x^2 - 7x + 9)$ is :

A. R

B. $R - \{0\}$

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

D. $R - \{1\}$

Answer: C

Watch Video Solution

93. Let $f(x) = x^2 - 2x - 3, x \geq 1$ and $g(x) = 1 + \sqrt{x+4}, x \geq -4$ then the number of real solution os equation $f(x) = g(x)$ is/are

A. 0

B. 1

C. 2

D. 4

Answer: B

Watch Video Solution

One Or More Than One Answe Is Are Correct

1. f (x) is an even periodic function with period 10 in $[0, 5], f(x) = \begin{cases} 2x & 0 \leq x < 2 \\ 3x^2 - 8 & 2 \leq x < 4 \\ 10x & 4 \leq x \leq 5 \end{cases}$. Then:

A. $f(-4) = 40$

B. $\dfrac{f(-13) - f(11)}{f(13) + f(-11)} = \dfrac{17}{21}$

C. $f(5)$ is not defined

D. Range of $f(x)$ is $[0, 50]$

Answer: A::B::D

Watch Video Solution

2. Let $f(x) = ||x^2 - 4x + 3| - 2|$. Which of the following is/are correct ?

A. $f(x) =$ m has exactly two real solutios of different sign $\forall m > 2$

B. $f(x) = m$ has exactly two real solution $\forall m \in (2, \infty) \cup \{0\}$

C. $f(x) = m$ has no solutions $\forall m < 0$

D. $f(x) = m$ has four distinct real solution $\forall m \in (0, 1)$

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

Watch Video Solution

3. Let $f(x) = \cos^{-1}\left(\frac{1 - \tan^2(x/2)}{1 + \tan^2(x/2)}\right)$. Solve for f(x).

Watch Video Solution

4. $|\log_e|x|| = |k - 1| - 3$ has four distict roots then k satisfies : (where $|x| < d^2, x \neq 0)$

A. $(-4, -2)$

B. $(4, 6)$

C. (e^{-1}, e)

D. (d^{-2}, e^{-1})

Answer: A::B

Watch Video Solution

5. Which of the following functions are defined for all $x \in R$? (Where$[.]$ = denotes greatest integer function)

A. $f(x) = \sin[x] + \cos[x]$

B. $f(x) = \sec^{-1}(1 + \sin^2 x)$

C. $f(x) = \sqrt{\frac{9}{8} + \cos x + \cos 2x}$

D. $f(x) = \tan(ln(1 + |x|))$

Answer: A::B::C

Watch Video Solution

6. Let $f(x) = \begin{cases} x^2 & 0 < x < 2 \\ 2x - 3 & 2 \leq x < 3 \\ x + 2 & x \geq 3 \end{cases}$ then the tuue equations:

A. $f\left(f\left(f\left(\frac{3}{2}\right)\right)\right) = f\left(\frac{3}{2}\right)$

B. $1 + f\left(f\left(f\left(\frac{5}{2}\right)\right)\right) = f\left(\frac{5}{2}\right)$

C. $f(f(f(2))) = f(1)$

D. $\underbrace{f(f(f(\ldots\ldots f(4))\ldots))} = 2012$

Answer: A::B::C

Watch Video Solution

7. Let $f\colon\left[-\frac{\pi}{3}, \frac{2\pi}{3}\right] \to [0, 4]$ be a function defined as $f(x) = \sqrt{3}\sin x - \cos x + 2$. Then $f^{-1}(x)$ is given by

(a) $\sin^{-1}\left(\frac{x-2}{2}\right) - \frac{\pi}{6}$

(b) $\sin^{-1}\left(\frac{x-2}{2}\right) + \frac{\pi}{6}$

(c) $\frac{2\pi}{3} + \cos^{-1}\left(\frac{x-2}{2}\right)$

(d) none of these

A. $f^{-1}(1)=\frac{4\pi}{3}$

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

C. $f^{-1}(2)=\frac{5\pi}{6}$

D. $f^{-1}(2)=\frac{7\pi}{6}$

Answer: A::D

Watch Video Solution

8. Let $f(x)$ be invertible function and let $f^{-1}(x)$ be is inverse. Let equation $f\left(f^{-1}(x)\right)=f^{-1}(x)$ has two real roots α and β (with in domain of $f(x)$), then :

A. $f(x)=x$ also have same two rreal roots

B. $f^{-1}(x)=x$ also have same two real roots

C. $f(x)=f^{-1}(x)$ also have same two real roots

D. Area of triangle formed by $(0,0),(\alpha,f(\alpha)),$ and $(\beta,f(\beta))$ is 1 unit

Answer: A::B::C

Watch Video Solution

9. In function $f(x) = \cos^{-1} x + \cos^{-1}\left(\frac{x}{2} + \frac{\sqrt{3 - 3x^2}}{2}\right)$, then Range of $f(x)$ is $\left[\frac{\pi}{3}, \frac{10\pi}{3}\right]]$ Range of $f(x)$ is $\left[\frac{\pi}{3}, 5\pi\right]$ $f(x)$ is one-one for $x \in \left[-1, \frac{1}{2}\right]$ $f(x)$ is one-one for $x \in \left[\frac{1}{2}, 1\right]$

A. Range of $f(x) is \left[\frac{\pi}{3}, \frac{10\pi}{3}\right]$

B. Rang $f(x) is \left[\frac{\pi}{3}, \frac{5\pi}{3}\right]$

C. f (x) is one-one for $x \in \left[-1, \frac{1}{2}\right]$

D. f (x) is one-one for $x \in \left[\frac{1}{2}, 1\right]$

Answer: B::C

Watch Video Solution

10. Which option (s) is/are ture ?

A. $f: R \to R,\ f(x) = e^{|x|} - e^{-x}$ is many-one into function

B. $f: R \to R,\ f(x) = 2x + |\sin x|$ is one-one onto

C. $f: R \to R,\ f(x) = \dfrac{x^2 + 4x + 30}{x^2 - 8x + 18}$ is many-one onto

D. $f: R \to R,\ f(x) = \dfrac{2x^2 - x + 5}{7x^2 + 2x + 10}$ is many-one into

Answer: A::B::D

Watch Video Solution

11. If $f(x) = \left[\dfrac{\ln(x)}{e}\right] + \left[\dfrac{\ln(e)}{x}\right]$, where [.] denotes greatest interger function, the which of the following are ture ?

A. range of $h(x) is \{-1, 0\}$

B. If $h(x) = -1,$ then x can be rational as well as irractional

C. If $h(x) = -1,$ then x can be rational as well as irrational

D. $h(x)$ is periodic function

Answer: A::C

Watch Video Solution

12. If $f(x) = \begin{cases} x^3 & x = Q \\ -x^3 & x \neq Q \end{cases}$, then :

A. f (x) is periodic

B. f (x) is many-one

C. f (x) is one-one

D. range of the function is R

Answer: C::D

Watch Video Solution

13. Let f(x) be a real valued function such that $f(0) = \frac{1}{2}$ and f(x+y)=f(x)f(a-y)+f(y)f(a-x), $\forall x, y \in R$, then for some real a,

A. f (x) is perodic function

B. f (x) is a constant function

C. $f(x) = \frac{1}{2}$

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

Answer: A::B::C

Watch Video Solution

14. f(x) is an even periodic function with period 10. In $[0, 5]\, f(x) = \begin{cases} 2x & 0 \leq x < 2 \\ 3x^2 - 8 & 2 \leq x < 4 \\ 10x & 4 \leq x \leq 5 \end{cases}$ Then :

A. $f(-4) = 40$

B. $\frac{f(-13) - x(11)}{f(13) + f(-11)} = \frac{17}{21}$

C. $f(5)$ is not defined

D. Range of $f(x)$ is $[0, 50]$

Answer: A::B::D

Watch Video Solution

15. For the equation $\frac{e^{-x}}{x+1}$ which of the following statement(s) is/are correct ?

A. when $\lambda \in (0, \infty)$ equation has 2 real and distinct roots

B. when $\lambda \in \left(-\infty, -e^2\right)$ equation has 2 real anddistinct roots

C. when $\lambda \in (0, \infty)$ equatio has 1 real root

D. when $\lambda \in (-e, 0)$ equation has no real root

Answer: B::C::D

Watch Video Solution

16. . For $x \in R^{+}$, if $x, [x], \{x\}$ are in harmonic progression then the value of x can not be equal to (where [*] denotes greatest integer function, {*} denotes fractional part function)

A. $\frac{1}{\sqrt{2}}\tan\frac{\pi}{8}$

B. $\frac{1}{\sqrt{2}}\cot\frac{\pi}{8}$

C. $\frac{1}{\sqrt{2}}\tan\frac{\pi}{12}$

D. $\frac{1}{\sqrt{2}}\cot\frac{\pi}{12}$

Answer: A::C::D

Watch Video Solution

17. The equation $||x-1|+a|=4$ can have real solutions for x if a belongs to the interval.

Watch Video Solution

18. If the domain of $f(x) = \frac{1}{\pi}\cos^{-1}\left[\log_3\left(\frac{x^2}{3}\right)\right]$ where, $x > 0$ is [a,b] and the range of $f(x)$ is [c,d], then :

A. a,b are the roots of the equation $x^4 - 3x^4 - 3xc^3 - x + 3 = 0$

B. a,b are the roots of the equatin $x^4 - x^3 + x^2 - 2x + 1 = 0$

C. $a^3 + d^3 = 1$

D. $a^2 + b^2 + c^2 = 11$

Answer: A::D

Watch Video Solution

19. The number of real values of x satisfying the equation ; $\left[\frac{2x+1}{3}\right] + \left[\frac{4x+5}{6}\right] = \frac{3x-1}{2}$ are greater than or equal to {[*] denotes greatest integer function):

A. 7

B. 8

C. 9

D. 10

Answer: A::B::C

Watch Video Solution

20. Let $f\left(x = \sin^6\left(\frac{x}{4}\right) + \cos^6\left(\frac{x}{4}\right). Iff f^n(x)$ denotes n^{th} derivative of f evaluated at x. Then which of the following hold ?

A. $f^{2014}(0) = -\frac{3}{8}$

B. $f^{2015}(0) = \frac{3}{8}$

C. $f^{2010}\left(\frac{\pi}{2}\right) = 0$

D. $f^{2011}\left(\frac{\pi}{2}\right) = \frac{3}{8}$

Answer: A::C::D

Watch Video Solution

21. Which of the following is (are) incorrect ?

A. If $f(x) = \sin x$ and $g(x) =$ sin x then range of $g(f(x))$ is $[-1, 1]$

B.

C. If $f(x) = \left(2011 - x^{2012}\right)^{\frac{1}{2012}}$ then $f(f(2)) = \frac{1}{2}$

D. The function $f: R \to R$ defined as $f(x) = \frac{x^2 + 4x + 30}{x^2 - 8x + 18}$ is not surjective.

Answer: A::B

Watch Video Solution

22. If [x] denotes the integral part of x for real x, and $S = \left[\frac{1}{4}\right] + \left[\frac{1}{4} + \frac{1}{200}\right] + \left[\frac{1}{4} + \frac{1}{100}\right] + \left[\frac{1}{4} + \frac{3}{200}\right] \ldots\ldots + \left[\frac{1}{4} + \frac{199}{200}\right]$ then S is

Watch Video Solution

23. Let $f(x) = \log_{\{x\}}[x]$

$g(x) = \log_{\{x\}} - \{x\}$

$h(x)\log_{\{x\}}\{x\}$

where $[], \{\}$ denotes the greatest integer function and fractional part function respectively.

For $x \in (1, 5) the f(x)$ is not defined at how many points :

A. 5

B. 4

C. 3

D. 2

Answer: C

Watch Video Solution

Comprehension Type Problems

1. Let $f(x) = \log_{\{x\}}[x]$

$g(x) = \log_{\{x\}} - \{x\}$

$h(x)\log_{\{x\}}\{x\}$

where $[], \{\}$ denotes the greatest integer function and fractional part function respectively.

If $A = \{x : x \in$ domine of $f(x)))$ and $B\{x : x$ domine of $g(x)\}$ then $\forall x \in (1, 5)$, $A - B$ will be :

A. $(2, 3)$

B. $(1, 3)$

C. $(1, 2)$

D. None of these

Answer: D

Watch Video Solution

2. Let $f(x) = \log_{\{x\}}[x]$

$g(x) = \log_{\{x\}} - \{x\}$

$h(x) = \log_{[x]}\{x\}$

where $[], \{\}$ denotes the greatest integer function and fractional part function respectively.

Domine of $h(x)$ is :

A. $[2, \infty)$

B. $[1, \infty)$

C. $[2, \infty) - \{I\}$

D. $R^{+} - \{I\}$

Answer: C

Watch Video Solution

3. θ is said to be well behaved if it lies in interval $\left[0, \frac{\pi}{2}\right]$. They are intelligent if they make domain of $f + g$ and g equal. The vlaue of θ for which $h(\theta)$ is defined are handosome. Let

$$f(x) = \sqrt{\theta x^2 - 2(\theta^2 - 3)x - 12\theta}, g(x) = \ln(x^2 - 49),$$

$$h(\theta)\ln\left[\int_0^\theta 4\cos^2 t dt - \theta^2\right],$$ where θ is in radians.

Complete set of vlaues of θ which are well behaved as well as intelligent

is:

A. $\left[\frac{3}{4}, \frac{\pi}{2}\right]$

B. $\left[\frac{3}{5}, \frac{7}{8}\right]$

C. $\left[\frac{5}{6}, \frac{\pi}{2}\right]$

D. $\left[\frac{6}{7}, \frac{\pi}{2}\right]$

Answer: D

Watch Video Solution

4. θ is said to be well behaved if it lies in interval $\left[0, \frac{\pi}{2}\right]$. They are intelligent if they make domain of $f + g$ and g equal. The vlaue of θ for which $h(\theta)$ is defined are handosome. Let

$f(x) = \sqrt{\theta x^2 - 2(\theta^2 - 3)x - 12\theta}, g(x) = \ln(x^2 - 49)$,

$h(\theta)\ln\left[\int_0^\theta 4\cos^2 t dt - \theta^2\right]$, where θ is in radians.

Complete set of vlaues of θ which are well behaved as well as intelligent is:

A. $\left[\frac{6}{7}, \frac{7}{2}\right]$

B. $\left(0, \frac{\pi}{3}\right]$

C. $\left[\frac{1}{4}, \frac{6}{7}\right]$

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

Answer: A

Watch Video Solution

5. θ is said to be well behaved if it lies in interval $\left[0, \frac{\pi}{2}\right]$. They are intelligent if they make domain of $f + g$ and g equal. The vlaue of θ for which $h(\theta)$ is defined are handosome. Let

$f(x) = \sqrt{\theta x^2 - 2(\theta^2 - 3)x - 12\theta}, g(x) = \ln(x^2 - 49)$,

$h(\theta)\ln\left[\int_0^\theta 4\cos^2 t dt - \theta^2\right]$, where θ is in radians.

Complete set of alues of θ which are intelligent is :

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

B. $\left[\frac{6}{7}, \frac{\pi}{2}\right]$

C. $\left[\frac{3}{4}, \frac{\pi}{2}\right]$

D. $\left[\frac{3}{5}, \frac{\pi}{2}\right]$

Answer: B

Watch Video Solution

6. Let $f(x) = 2 - |x - 3|, 1 \leq x \leq 5$ and for rest of the values f (x) can be obtained by unsing the relation $f(5x) = \alpha f(x) \forall x \in R$.

The vlaue of f (2007), taking $\alpha = 5,$ is :

A. 1118

B. 2007

C. 1250

D. 132

Answer: A

Watch Video Solution

7. An even periodic functin $f: R \to R$ with period 4 is such that

$$f(x) = \begin{bmatrix} \max.\left(|x|, x^2\right) & 0 \leq x < 1 \\ x & 1 \leq x \leq 2 \end{bmatrix}$$

The value of $\{f(5.12)\}$ (where {.} denotes fractional part function), is :

A. $\{f(3.26)\}$

B. $\{f(7.88)\}$

C. $\{f(2.12)\}$

D. $\{f(5.88)\}$

Answer: B

Watch Video Solution

8. An even periodic functin $f: R \to R$ with period 4 is such that

$$f(x) = \begin{bmatrix} \max . (|x|, x^2) & 0 \le x < 1 \\ x & 1 \le x \le 2 \end{bmatrix}$$

The number of solution of $f(x)|3 \sin x|$ for $x \in (-6, 6)$ are :

A. 5

B. 3

C. 7

D. 9

Answer: C

Watch Video Solution

9. Let $f(x) = \dfrac{2|x| - 1}{x - 3}$

Range of $f(x)$:

A. $R - \{3\}$

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

C. $\left(-2, \frac{1}{3}\right]$ uu (2,oo)`

D. R

Answer: B

Watch Video Solution

10. Let $f(x) = \frac{2|x| - 1}{x - 3}$

Range of the values of 'k' for which $f(x) = k$ has exactly two distinct solutions:

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

B. $(-2, 1]$

C. $\left(0, \frac{2}{3}\right]$

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

Answer: A

Watch Video Solution

11. Let $f(x)$ be a continuous function (define for all x) which satisfies $f^3(x) - 5f^2(x) + 10f(x) - 12 \geq 0$, $f^2(x) + 3 \geq 0$ and $f^2(x) - 5f(x) +$

If distinct positive number b_1, b_2 and b_3 ar in G.P. then $f(1) + \ln b_1), f(2) + \ln b_2, f(3) + \ln b_3$ are in :

A. A.P.

B. G.P.

C. H. P.

D. A. G. P.

Answer: A

Watch Video Solution

12. Let $f(x)$ be a continuous function (define for all x) which satisfies $f^3(x) - 5f^2(x) + 10f(x) - 12 \geq 0$, $f^2(x) + 3 \geq 0$ and $f^2(x) - 5f(x) +$

The equation of tangent that can be drawn from $(2, 0)$ on the curve $y = x^2 f(\sin x)$ is :

A. $y = 24(x + 2)$

B. $y = 12(x + 2)$

C. $y = 24(x - 2)$

D. $y = 12(x - 2)$

Answer: C

Watch Video Solution

13. Let $f: [2, \infty) \to \{1, \infty)$ defined by $f(x) = 2^{x^4 - 4x^3}$ and $g: \left[\frac{\pi}{2}, \pi\right] \to A$ defined by $g(x) = \frac{\sin x + 4}{\sin x - 2}$ be two invertible functions, then

The set "A" equals to

A. $[5, 2]$

B. $[-2, 5]$

C. $[-5, 2]$

D. $[-5, -2]$

Answer: D

Watch Video Solution

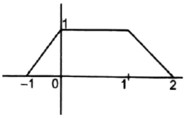
Matching Type Problems

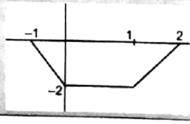
1. If $x, y, z \in R$ satisfies the system of equations $x + (y) + (s) = 12.7, [x] + \{y\} + z = 4.1$ and $\{x\} + y + [z] = 2$ where {.} and [.] denotes the fractional and integral parts respectively) then match the following

	Column-I		Column-II
(A)	$\{x\} + \{y\} =$	(P)	7.7
(B)	$[z] + [x] =$	(Q)	1.1
(C)	$x + \{z\} =$	(R)	1
(D)	$z + [y] - \{x\} =$	(S)	3
		(T)	4

Watch Video Solution

2. Given the graph of $y = f(x)$



	Column-I		Column-II
(A)	$y = f(1-x)$	(P)	

Watch Video Solution

3.

	Column-I		Column-II
(A)	$f(x) = \sin^2 2x - 2\sin^2 x$	(P)	Range contains no natural number
(B)	$f(x) = \frac{4}{\pi}(\sin^{-1}(\sin \pi x))$	(Q)	Range contains atleast one integer
(C)	$f(x) = \sqrt{\ln(\cos(\sin x))}$	(R)	Many one but not even function
(D)	$f(x) = \tan^{-1}\left(\frac{x^2+1}{x^2+\sqrt{3}}\right)$	(S)	Both many one and even function
		(T)	Periodic but not odd function

Watch Video Solution

4.

	Column-I		Column-II
(A)	If $\|x^2-x\| \geq x^2+x$, then complete set of values of x is	(P)	$(0, \infty)$
(B)	If $\|x+y\| > x-y$, where $x>0$, then complete set of values of y is	(Q)	$(-\infty, 0]$
(C)	If $\log_2 x \geq \log_2(x^2)$, then complete set of values of x is	(R)	$[-1, \infty)$

Watch Video Solution

5.

	Column-I		Column-II
(A)	Domain of $f(x)=\ln \tan^{-1}\{(x^3-6x^2+11x-6)x(e^x-1)\}$ is	(P)	$\left[-1, \frac{5}{4}\right]$
(B)	Range of $f(x)=\sin^2\frac{x}{4}+\cos\frac{x}{4}$ is	(Q)	$[2, \infty)$
(C)	The domain of function $f(x)=\sqrt{\log_{(\|x\|-1)}(x^2+4x+4)}$ is	(R)	$(1,2)\cup(3,\infty)$
(D)	Let $f(x)=\begin{cases} x^2 & x<1 \\ x+1 & x\geq 1\end{cases}; g(x)=\begin{cases} x+2 & x<1 \\ x^2 & x\geq 1\end{cases}$ Then range of function $f(g(x))$ is	(S)	$[0, \infty)$
		(T)	$(-\infty,-3)\cup(-2,-1)\cup(2,\infty)$

Watch Video Solution

6. Let $f(x)=\begin{cases} 1+x, & 0\leq x\leq 2 \\ 3-x, & 2<x\leq 3\end{cases}$

find (fof) (x).

Watch Video Solution

Subjective Type Problems

1. Let $f(x)$ be a polynomial of degree 6 with leading coefficient 2009, Suppose further, that $f(1), = 1, f(2) = 3 = 5, f(4) = 7, f(5) = 9, f(2) = 2,$ then the sum of all the digits of $f(6)$ is

Watch Video Solution

2. Let $f(x) = x^3 - 3x + 1$. Then number of different real solutions of $f(f(x)) = 0$

Watch Video Solution

3. If $f(x + y + 1) = \left\{\sqrt{f(x)} + \sqrt{f(y)}\right\}^2$ and $f(0) = 1 \forall x, y \in R, determ \in ef(n), n \in N.$

Watch Video Solution

4. If the domain of $f(x) = \sqrt{12 - 3^x - 3^{3-x}} + \sin^{-1}\left(\frac{2x}{3}\right) is [a, b]$, then $a = \ldots\ldots$

Watch Video Solution

5. The number of elements in the range of the function :

$y = \sin^{-1}\left[x^2 + \frac{5}{9}\right] + \cos^{-1}\left[x^2 - \frac{4}{9}\right]$ where [.] denotes the greatest integer function is

Watch Video Solution

6. The number of integers in the range of function $f(x) = [\sin x] + [\cos x] + [\sin x + \cos x]$ is (where $[.]$= denotes greatest integer function)

Watch Video Solution

7. If $P(x)$ is polynomial of degree 4 such than $P(-1) = P(1) = 5$ and $P(-2) = P(0) = P(2) = 2$ find the maximum vaue of P (x).

Watch Video Solution

8. The number of integral vlaue (s) of k for which the curve $y = \sqrt{-x^2 - 2x}$ and $x + y - k = 0$ intersect at 2 distinct points is/are

Watch Video Solution

9. Let the solution set of the equation $\sqrt{\left[x + \left[\frac{x}{2}\right]\right]} + \left[\sqrt{\{x\}} + \left[\frac{x}{3}\right]\right] = 3$ is $[a, b)$. Find the product ab. (where $[\cdot]$ and $\{\cdot\}$ denote greatest integer and fractional part function, respectively).

Watch Video Solution

10. For the real number x, let $f(x) = \frac{1}{2011\sqrt{1-x^{2011}}}$. Find the number of real roots of the equation

$f(f(\ldots..(f(x))\ldots..) = (\{-x\}$

where f is applies 2013 times and {.} denotes fractional part function.

Watch Video Solution

11. Find the number of elements contained in the range of the function $f(x) = \left[\frac{x}{6}\right]\left[\frac{-6}{x}\right] \forall x \in$ (0,30)]$where[.]$` denotes greatest integer function)

Watch Video Solution

12. Let $f(x, y) = x^2 - y^2$ and $g(x, y) = 2xy.$ such that $(f(x, y))^2 - (g(x, y))^2 = \frac{1}{2}$ and $f(x, y). G(x, y) = \frac{\sqrt{3}}{4}$ Find the number of ordered pairs (x, y) ?

Watch Video Solution

13. Let $f(x) = \frac{x+5}{\sqrt{x^2+1}}$, then the smallest integral value of k for which $f(x) \leq k \forall x \in R$is

Watch Video Solution

14. The number of roots of equation $\left(\frac{(x-1)(x-3)}{(x-2)(x-4)} - e^x\right)\left(\frac{(x+1)(x+3)}{(x+2)(x+4)} - e^{-x}\right)\left(x^3 - \cos x\right) = 0$:

Watch Video Solution

15. Let $f(x) = x^2 - bx + c, b$ is an odd positive integer. Given that $f(x) = 0$ has two prime numbers an roots and $b + c = 35$. If the least value of $f(x) \forall x \in Ris\lambda$, then $\left|\frac{\lambda}{3}\right|$ is equal to (where [.] denotes greatest integer functio)

Watch Video Solution

16. Let $f(x)$ be a continuous function such that $f(0) = 1$ and $f(x) = f\left(\frac{x}{7}\right) = \frac{x}{7} \forall x \in R,$ then $f(42)$ is

Watch Video Solution

17. If $x = 10\sum_{r=3}^{100} \frac{1}{(r^2 - 4)}$, then $[x] =$

(where [.] denotes gratest integer function)

Watch Video Solution

18. Let f(x)= cx+d/ax+b . Then fof(x) = x provided that.

A. d=-a

B. d=a

C. a=b=c=d=1

D. a=b=1

Answer:

Watch Video Solution

19. Let $A = \{x \mid x^2 - 4x + 3 < 0, x \in R\}$ $B = \{x \mid 2^{1-x} + p \leq 0; x^2 - 2(p+7)x + 5 \leq 0\}$ If $A \subset B$, then the range of real number $p \in [a, b]$ where, a,b are integers. Find the value of $(b - a)$.

Watch Video Solution

20. Let the maximum value of expression $y = \frac{x^4 - x^2}{x^6 + 2x^3 - 1}$ for $x > 1 is \frac{p}{q}$, where p and q are relatively prime natural numbers, then $p + q =$

Watch Video Solution

21. If f(x) is an even function then find the number of distinct real numbers x such that $f(x) = f\left(\frac{x+1}{x+2}\right)$.

Watch Video Solution

22. The least integral value of m, m $\in R$ for which the range of function $f(x) = \frac{x+m}{x^2+1}$ contains the interval $[0, 1]$ is :

Watch Video Solution

23. Let x_1, x_2, x_3 satisfying the equation $x^3 - x^2 + \beta x + \gamma = 0$ are in GP where $(x_1, x_2, x_3 > 0)$, then the maximum value of $[\beta] + [\gamma] + 2$ is, [.] is greatest integer function.

Watch Video Solution

24. Let $A = \{1, 2, 3, 4\}$ and $B = \{0, 1, 2, 3, 4, 5\}$. If 'm' is the number of strictly increasing function f, $f: A \to B$ and n is the number of onto functions $g: B \to A$. Then the last digit of n-m is.

Watch Video Solution

25. The value of $\sum_{r=1}^{1024} [\log_2 r]$ is equal to, ([.] denotes the greatest integer function)

Watch Video Solution

26. Let $f(x) = \frac{ax+b}{xc+d}$, where a,b,c d are non zero If $f(7) = 7, f(11) = 11$ and $f(f(x)) = x$ for all x expect $-\frac{d}{c}$. The unique number which is not is the range of f is

Watch Video Solution

27. It is pouring down rain and the amount of rain hitting point (x, y) is given by $f(x, y) = \left|x^3 + 2x^2y - 5xy^2 - 6y^3\right|$. If Mr. 'A' starts at $(0, 0)$, find number of possible value (s) for 'm' such that y= mx is a line along which Mr.' A could walk without any rain falling on him.

Watch Video Solution

28. Let P (x) be a cubic polynomical with leading co-efficient unity. Let the remainder when P (x) is divided by $x^2 - 5x + 6$ equals 2 times the remainder when P (x) is divided by $x^2 - 5x + 4$. If $P(0) = 100$, find the sum of the digits of $P(5)$,

Watch Video Solution

29. Let $f(x) = x^2 + 10x + 20$. Find the number of real solution of the equation $f(f(f(f(x)))) = 0$

Watch Video Solution

30. If range of $f(x) = \frac{(\ln x)\left(\ln x^2\right) + \ln x^3 + 3}{\ln^2 x + \ln x^2 + 2}$ can be expressed as $\left[\frac{a}{b}, \frac{c}{d}\right]$ where a,b,c and d are prime numbers (not nacessarily distinct) then find the value of $\frac{(a+b+c+d)}{2}$.

Watch Video Solution

31. Polynomial $P(x)$ contains only terms of aodd degree. when $P(x)$ is divided by $(x-3)$, the ramainder is 6. If $P(x)$ is divided by $\left(x^2-9\right)$ then remainder is $g(x)$. Then find the value of $g(2)$.

Watch Video Solution

32. The equation $2x^3 - 3x^2 + p = 0$ has three real roots. Then find the minimum value of p.

Watch Video Solution

33. Find the number of integers in the domain of $f(x) = \frac{1}{\sqrt{\ln \cos^{-1} x}}$

Watch Video Solution