TOPICS COVERED

FUNCTIONS

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

(1) $(-\infty,1)$ (2) $(-\infty,1)\cap(2,\infty)$

(3) $(-\infty,1)\cup(2,\infty)$ (4) $(2,\infty)$

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

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

(3) $\left(-\infty,-\frac{1}{2}\right]\cup\left[\frac{1}{\sqrt{2}},+\infty\right)$ (4) $\left[\frac{1}{\sqrt{2}},1\right]$

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

(1) $\left[-\sqrt{3},\sqrt{3}\right]$

(2) $\left[-1-\sqrt{3},-1+\sqrt{3}\right]$

(3) $[-2,2]$

(4) $\left[-2,-\sqrt{3},-2+\sqrt{3}\right]$

4. The domain of the function $f(x)=\frac{1}{\sqrt{x^{12}-x^9+x^4-x+1}}$ is

(1) $(-\infty,-1)$ (2) $(1,\infty)$

(3) (–1, 1) (4) $(-\infty,\infty)$

5. The domain of the function $f(x)=\sqrt{\frac{(x+1)(x-3)}{(x-2)}}$ is given by

(1) $[-1,2)\cup[3,\infty)$ (2) $(-1,2)\cup[3,\infty)$

(3) $[-1,2]\cup[3,\infty)$ (4) none of these

6. The domain of the function $f(x)=\sqrt{x-1}+\sqrt{5-x}$ is

(1) $[1,\infty)$ (2) $(-\infty,5)$

(3) (1, 5) (4) [1, 5]

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

(1) $(-\infty,1)$ (2) $(-1,\infty)$

(3) [0, 1] (4) [– 1, 1]

8. The domain of the function $f(x)=\sqrt{\frac{x+3}{(2-x)(x-5)}}$ is

(1) $(-\infty,-3]\cup(2,5)$ (2) $(-\infty,3)\cup(2,5)$

(3) $(-\infty,3)\cup[2,5]$ (4) none of these

9. The domain of the function $f(x)=\frac{1}{\sqrt{|x|-x}}$ is

(1) $(0,\infty)$ (2) $(-\infty,0)$

(3) $(-\infty,\infty)$ (4) none of these

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

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

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

(3) $[-1,1]\cup(-\infty,-2)\cup(2,\infty)$

(4) none of these

11. The domain of definition of the function $y=\sqrt{\log_{10}\left(\frac{5x-x^2}{4}\right)}$ is

(1) [1, 4] (2) (1, 4)

(3) [1, 4) (4) (1, 4]

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

(1) [– 2, 1] (2) [–2, 1[

(3) [– 2, 0 [$\cup$]0, 1[(4) none of these

13. The domain of the function $f(x)=\log_{10}\frac{x-5}{x^2-10x+24}-\sqrt[3]{x+5}$ is

(1) $(4,5)$ (2) $(6,\infty)$

(3) $(4,5)\cup(6,\infty)$ (4) $(4,5]\cup(6,\infty)$

14. The domain of the function $f(x)=\sqrt{\log_{10}\frac{3-x}{x}}$ is

(1) $\left(0,\frac{3}{2}\right)$ (2) $(0,3)$

(3) $\left(-\infty,\frac{3}{2}\right]$ (4) $\left(0,\frac{3}{2}\right]$

15. The dmain of the function $f(x)=\log_{10}|4-x^2-|$ is

(1) $(-\infty,\infty)-(2,2)$ (2) $(0,\infty)$

(3) $(-\infty,0)$ (4) none of these

16. The domain of the function $f(x)=\log_2\log_3\log_4 x$ is

(1) $[4,\infty)$ (2) $(4,\infty)$

(3) $(-\infty,4)$ (4) none of these

17. The domain of the function $f(x)=\frac{1}{\log_3(x-2)}+\sqrt{5-x}$ is

(1) $[2,3]-\{3\}$ (2) $(2,5]-\{3\}$

(3) $[2,5)-\{3\}$ (4) $(2,5)-\{3\}$

18. Thwe domain of the function $f(x)=\log_{10}\left(\sqrt{x-4}+\sqrt{6-x}\right)$ is

(1) (4, 6) (2) [4, 6]

(3) [4, 6) (4) none of these

19. The domain of the function $f(x)=\log_{10}\left[1-\log_{10}\left(x^2-5x+16\right)\right]$

(1) (2, 3) (2) [2, 3]

(3) (2, 3] (4) [2, 3)

20. The domain of the function $f(x)=\log_{1/2}\left(x-\frac{1}{2}\right)+\log_2\sqrt{4x^2-4x+5}$ is

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

(3) $(-\infty,\infty)$ (4) none of these

21. The domain of the function $f(x)=\log_{10}\sin(x-3)+\sqrt{16-x^2}$ is

(1) (3, 4) (2) (– 4,4)

(3) $(3,\pi+3)$ (4) none of these

22. The domain of the function $f(x)=\log_x\cos x$ is

(1) $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)-\{1\}$ (2) $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]-\{1\}$

(3) $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$ (4) none of these

23. The domain of the function $f(x)=\frac{1}{\sqrt{|\sin x|+\sin x}}$ is

(1) $(-2n\pi,2n\pi)$

(2) $(2n\pi,(2n+1)\pi)$

(3) $\left((4n-1)\frac{\pi}{2},(4n+1)\frac{\pi}{2}\right)$

(4) none of these

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

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

(3) $[-2,-1]\cup[1,2]$ (4) $(-2,-1)\cup(1,2)$

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

(1) (2, 3) (2) [2, 3)

(3) (2, 3] (4) none of these

26. The domain of the function $f(x)=\sqrt{3-x}+\cos^{-1}\left(\frac{3-2x}{5}\right)$

(1) [– 1, 3] (2) (– 1, 3]

(3) [-1, 3) (4) none of these

27. The domain of the function , $f(x)=\sin^{-1}\left(\frac{1+x^3}{2x^{3/2}}\right)+\sqrt{\sin(\sin x)}+\log_{(3(x)+1)}(x^2+1)$ where { } represents fractional part function, is

(1) { 1 } (2) R – {1, – 1}

(3) $x>3, x\neq 1$ (4) none of these

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

(1) $(-\infty,\infty)-\{1\}$ (2) $(2,\infty)$

(3) [–1, 1) (4) ϕ

29. The domain of the function $f(x)=\cos^{-1}\left(\frac{2-|x|}{4}\right)+\left[\log(3-x)\right]^{-1}$

(1) $[-6,3)-\{2\}$ (2) $[-6,2)\cup(2,3]$

(3) $[-6,3]$ (4) $[-6,3)$

30. The domain of the function $f(x)=\sin^{-1}\left(\frac{x-3}{2}\right)-\log_{10}(4-x)$ is

(1) $(1,4)$ (2) $[1,4]$

(3) $[1,4)$ (4) $(1,4]$

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

(1) $\left[-\frac{\pi}{6}+2n\pi,\frac{\pi}{6}+2n\pi\right]$

(2) $\left(-\frac{\pi}{6}+2n\pi,\frac{\pi}{6}+2n\pi\right)$

(3) $\left(-\frac{\pi}{6}+2n\pi,\frac{\pi}{6}+2n\pi\right]$

(4) $\left[-\frac{\pi}{6}+2n\pi,\frac{\pi}{6}+2n\pi\right)$

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

(1) $2n\pi-\frac{\pi}{6}\le x\le 2n\pi+\frac{\pi}{6}, n\in I$

(2) $0\le x\le 2n\pi+\frac{\pi}{6}, n\in I$

(3) $2n\pi-\frac{\pi}{6}< x< 2n\pi+\frac{\pi}{6}, n\in I$

(4) $2n\pi-\frac{\pi}{6}\le x\le 0, n\in I$

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

(1) $[-1,0]$ (2) $\{-1,0\}$

(3) $(-\infty,-1]\cup[0,\infty)$ (4) $(-\infty,\infty)$

34. The domain of the function $f(x)=\sqrt[3]{1-3x}+3\cos^{-1}\left(\frac{2x-1}{3}\right)+e^{3\tan x}$ is

(1) $[-1,2]$ (2) $(-1,2)$

(3) $(-\infty,\infty)$ (4) none of these

35. Let $f(x)=(-1)^{[x]}$ (where [.] denotes the greatest integer function), then

(1) Range of f is {-1, 1}

(2) f *is* an even function

(3) f is an odd function

(4) $\lim_{x\to n} f(x)$ exists, for every integer n

36. The domain of the function $f(x)=\frac{1}{\sqrt{[x]^2-[x]-6}}$ is

(1) $(-\infty,-2)\cup[4,\infty)$ (2) $(-\infty,-2]\cup[4,\infty)$

(3) $(-\infty,-2)\cup(4,\infty)$ (4) none of these

37. The domain of the function $f(x)=\sqrt{x^2-[x]^2}$, where [x] denotes the greatest integer less than or equal to *x*, is

(1) $(0,\infty)$ (2) $(-\infty,0)$

(3) $(-\infty,\infty)$ (4) none of these

38. Which of the following is a function ([.] denotes the greatest integer function, {.} denotes the fractional part function) ?

(1) $\frac{1}{\log[1-|x|]}$ (2) $\frac{x!}{\{x\}}$

(3) $x!\{x\}, x\in N$ (4) $\frac{\log(x-1)}{\sqrt{1-x^2}}$

39. Range of the function f defined by $f(x)=\left[\frac{1}{\sin\{x\}}\right]$ (where [.] and {.} respectively denote the greatest integer and the fractional part functions) is

(1) I, the set of integers

(2) N, the set of natural numbers

(3) W, the set of whole numbers

(4) { 2, 3, 4, ...}

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

(1) $\left[0,\frac{1}{2}\right]$ (2) $\left[-\frac{1}{2},\frac{1}{2}\right]$

(3) $\left[-\frac{1}{2},0\right]$ (4) none of these

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

(1) $[0,1[$ (2) $[0,1]$

(3) $]0,1[$ (4) none of these

42. The range of the function $y=\frac{1}{2-\sin 3x}$ is

(1) $\left(\frac{1}{3},1\right)$ (2) $\left[\frac{1}{3},1\right)$

(3) $\left[\frac{1}{3},1\right]$ (4) none of these

43. The range of the function $f(x)=\log_e(3x^2-4x+5)$ is

(1) $\left(-\infty,\log_e\frac{11}{3}\right]$ (2) $\left[\log_e\frac{11}{3},\infty\right)$

(3) $\left[-\log_e\frac{11}{3},\log_e\frac{11}{3}\right]$ (4) none of these

44. The range of the function $y=3\sin\sqrt{\frac{\pi^2}{16}-x^2}$ is

(1) $\left[0\frac{3}{\sqrt{2}}\right]$ (2) $\left[-\frac{3}{\sqrt{2}},\frac{3}{\sqrt{2}}\right]$

(3) $\left[-\frac{3}{\sqrt{2}},0\right]$ (4) none of these

45. The range of the function

$f(x)=\sqrt{3x^2-4x+5}$ is

(1) $\left[-\infty,\sqrt{\frac{11}{3}}\right]$ (2) $\left(-\infty,\sqrt{\frac{11}{3}}\right)$

(3) $\left[\sqrt{\frac{11}{3}},\infty\right)$ (4) $\left(\sqrt{\frac{11}{3}},\infty\right)$

46. The range of the function $y=\sin^{-1}\left(\frac{x^2}{1+x^2}\right)$ is

(1) $\left(0,\frac{\pi}{2}\right)$ (2) $\left[0,\frac{\pi}{2}\right)$

(3) $\left[0,\frac{\pi}{2}\right]$ (4) none of these

47. If $A=\left\{x:\frac{\pi}{6}\le x\le\frac{\pi}{3}\right\}$ and $f(x)=\cos x-x(1+x)$, then f (A) is equal to

(1) $\left[\frac{1}{2}-\frac{\pi}{2}-\frac{\pi^2}{9},\frac{\sqrt{3}}{2}-\frac{\pi}{6}-\frac{\pi^2}{36}\right]$

(2) $\left[\frac{1}{2}+\frac{\pi}{3}-\frac{\pi^2}{9},\frac{\sqrt{3}}{2}+\frac{\pi}{6}-\frac{\pi^2}{36}\right]$

(3) $\left(\frac{1}{2}-\frac{\pi}{3}-\frac{\pi^2}{9},\frac{\sqrt{3}}{2}-\frac{\pi}{6}-\frac{\pi^2}{36}\right)$

(4) none of these

48. Range of values of $f(x)=1+\sin x+\sin^3 x+\sin^5 x...,$ $x\in\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$ is

(1) $(0,1)$ (2) $(-\infty,\infty)$

(3) $(-2,2)$ (4) none of these

49. The range of the function $f(x)=\tan\sqrt{\frac{\pi^2}{9}-x^2}$ is

(1) $\left[0,\sqrt{3}\right]$ (2) $\left(0,\sqrt{3}\right)$

(3) $\left[0,\sqrt{3}\right)$ (4) $\left(0,\sqrt{3}\right]$

50. The function $f(x)=\log\left(x+\sqrt{x^2+1}\right)$ is

(1) an even function

(2) an odd function

(3) a periodic function

(4) neither an even nor an odd function

51. A function whose graph is symmetrical about the *y-axis* is given by

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

(2) $f(x)=\frac{\sec^4 x+co\sec^4 x}{x^3+x^4\cot x}$

(3) $f(x+y)=f(x)+f(y),\forall x,y\in R$

(4) none of the above

52. If f is an even function and g is an odd function, then the function *fog* is

(1) an even function

(2) an odd function

(3) neither even nor odd

(4) a periodic function

53. If f is an odd function and g is an even function, then the function *fog* is

(1) an even function

(2) an odd function

(3) neither even nor odd

(4) a periodic function

54. Let f and g be two odd functions, then the function *fog* is

(1) an even function

(2) an odd function

(3) neither even nor odd

(4) a periodic function

55. The functions $f(x)=\log(x-1)-\log(x-2)$ and $g(x)=\log\left(\frac{x-1}{x-2}\right)$ are identical when x lies in the interval

(1) $[1,2]$ (2) $[2,\infty]$

(3) $(2,\infty)$ (4) $(-\infty,\infty)$

56. The period of the

$f(x)=\frac{|\sin x|-|\cos x|}{|\sin x+\cos x|}$, is

(1) $\frac{\pi}{2}$ (2) 2π

(3) π (4) none of these

57. The period of the function $f(x)=\sin^4 x+\cos^4 x$ is

(1) π (2) $\frac{\pi}{2}$

(3) 2π (4) none of these

58. Which of the following function has period π ?

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

(2) $|\tan x|+\cos 2x$

(3) $4\cos\left(2\pi x+\frac{\pi}{2}\right)+2\sin\left(\pi x+\frac{\pi}{4}\right)$

(4) none of the above

59. The period of the function $f(x)=x[x]$ is

(1) 1 (2) 2

(3) non periodic (4) none of these

60. period of the function $\log\left(\sin^{-1}\left(x-[x]\right)\right)$ ([.] denotes the greatest integer function) is

(1) 1 (2) 2π

(3) $\frac{\pi}{2}$ (4) none of these

61. If $f:R\to R$ is a function satisfying the property $f(2x+3)+f(2x+7)=2$, $\forall x\in R$, then the period of $f(x)$ is

(1) 2 (2) 4

(3) 8 (4) 12

62. The period of the function $f(x)=7\cos(3x+5)$ is

(1) 2π (2) $\frac{2\pi}{3}$

(3) $\frac{\pi}{3}$ (4) none of these

63. The period of the function $f(x)=a\sin kx+b\cos kx$ is

(1) $\frac{2\pi}{k}$ (2) $\frac{2\pi}{|k|}$

(3) $\frac{\pi}{|k|}$ (4) none of these

64. The period of the function $f(x)=\cos x^2$ is

(1) 2π (2) π

(3) $\frac{\pi}{2}$ (4) none of these

65. The period of the function $f(x)=|\sin 4x|+|\cos 4x|$ is

(1) $\frac{\pi}{2}$ (2) $\frac{\pi}{8}$

(3) $\frac{\pi}{4}$ (4) none of these

66. If $f(x)=\sqrt{3|x|-x-2}$ and g (x) = sin x, then domain of definition of fog (x) is

(1) $\left\{2n\pi+\frac{\pi}{2}\right\}_{n\in 1}$

(2) $\bigcup_{n\in 1}\left(2n\pi+\frac{7\pi}{6},2n\pi+\frac{11\pi}{6}\right)$

(3) $\left\{2n\pi+\frac{7\pi}{6}\right\}_{n\in 1}$

(4) $\left(2n\pi+\frac{7\pi}{6},2n\pi+\frac{11\pi}{6}\right)\bigcup_{n,\,m\in 1}\left(2m\pi+\frac{\pi}{2}\right)$

67. Let $f(x)$ be a function defined on [0, 1] such that $f(x)=\begin{bmatrix} x & x\in Q \\ 1-x & x\notin Q \end{bmatrix}$. then for all

$x \in [0,1]$, $fof\,(x)$ is

(1) a constant (2) $1+x$

(3) x (4) none of these

68. If $f(x)=1-x, x \in [-3,3]$, then the domain of $f[f(x)]$ is

(1) $[-2,3]$ (2) $(-2,3)$

(3) $[-2,3)$ (4) $(-2,3]$

69. If $f(x)=\frac{1-x}{1+x}; x \neq 0,$ then

$$f[f(x)]+f\left[f\left(\frac{1}{x}\right)\right]$$

(1) < 2 (2) ≥ 2

(3) = 2 (4) non of these

70. $f(x)=\begin{cases} |x|, & x \leq 1 \\ 2-x, & x>1 \end{cases}$, then $f[f(x)]$ is equal to

(1) $\begin{cases} 2-|x|, & x<-1 \\ |x|, & -1 \leq x \leq 1 \\ |2-x|, & x>1 \end{cases}$

(2) $\begin{cases} |x|, & x<-1 \\ 2-|x|, & -1 \leq x \leq 1 \\ |2-x|, & x>1 \end{cases}$

(3) $\begin{cases} |2-x|, & x<-1 \\ |x|, & -1 \leq x \leq 1 \\ 2-|x|, & x>1 \end{cases}$

(4) none of these

71. The function $f:(-\infty,-1] \to (0,e^5)$ defined by $f(x)=e^{x^3-3x+2}$, is

(1) many one and onto (2) many one and into

(3) one-one and onto (4) one-one and into

72. A function f from the set of natural numbers to integers defined by

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

(1) one-one but not onto

(2) onto but not one-one

(3) one-one and onto both

(4) neither one-one nor onto

73. The function $f:R \to R$, defined by $f(x)=[x], \forall x \in R,$ is

(1) one-one (2) onto

(3) both one-one and onto

(4) neither one-one nor onto

74. Let $f:R \to R$, be a function defined by $f(x)=\sin(2x-3)$, then f is

(1) injective (2) surjective

(3) bijective (4) none of these

75. Which of the following functions from I to itself are bijections ?

(1) $f(x)=x+3$ (2) $f(x)=x^5$

(3) $f(x)=3x+2$ (4) $f(x)=x^2+x$

76. Which of the following functions is (are) injective map(s) ?

(1) $f(x)=x^2+2, x \in (-\infty,\infty)$

(2) $f(x)=|x+2|, x \in [-2,\infty)$

(3) $f(x)=(x-4)(x-5), x \in (-\infty,\infty)$

(4) $f(x)=\frac{4x^2+3x-5}{4+3x-5x^2}, x \in (-\infty,\infty)$

77. Let $A=\{x \in R \mid -1 \leq x \leq 1\}=B.$ then the mapping $f:A \to B$ is given by $f(x)=x|x|$, is

(1) injective but not surjective

(2) surjective but not injective

(3) bijective (4) none of these

78. If the function $f:(-\infty,\infty) \to B$ defined by

$f(x)=-x^2+6x-8$ is bijective , then B is equal to

(1) $[1,\infty)$ (2) $(-\infty,1]$

(3) $(-\infty,\infty)$ (4) none of these

79. Let $f:R\to R$ be defined by $f(x)=\frac{x-a}{x-b}$, *where* $a\neq b.$ then f is

(1) injective but not surjective

(2) surjective but not injective

(3) bijective (4) none of the above

80. The number of bijective functions from a set of itself when A contains 106 elements, is

(1) 106 (2) $(106)^2$

(3) $(106)!$ (4) 2^{106}

81. The number of bijective functions from a set A=$\{1,2,....,n\}, n\geq 2$ onto B =$\{a,b\}$ is

(1) ${}^{n}p_2$ (2) 2^2-2

(3) 2^2-1 (4) none of these

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

(1) 144 (2) 12

(3) 24 (4) 64

83. Let $f:(4,6)\to(6,8)$ *be* a function defined by $f(x)=x+\left[\frac{x}{2}\right]$ (where [.] denotes the greatest integer function), then $f^{-1}(x)$ is equal to

(1) $x-\left[\frac{x}{2}\right]$ (2) $-x-2$

(3) $x-2$ (4) $\frac{1}{x+\left[\frac{x}{2}\right]}$

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

(1) – 2 (2) –1

(3) 1 (4) 2

85. The inverse of the function $f(x)=\frac{a^x-a^{-x}}{a^x+a^{-x}}$ is

(1) $\frac{1}{2}\log_a\left(\frac{1-x}{1+x}\right)$ (2) $\frac{1}{2}\log_a\left(\frac{1+x}{1-x}\right)$

(3) $\log_a\left(\frac{1+x}{1-x}\right)$ (4) none of these

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

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

(2) $\left(\frac{1}{2}\right)\left[1+\sqrt{1+4\log_2 x}\right]$

(3) $\left(\frac{1}{2}\right)\left[1-\sqrt{1+4\log_2 x}\right]$

(4) not defined

87. The inverse of the function $y=\left[1-(x-3)^4\right]^{1/7}$ is

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

(3) $3-\left(1+x^7\right)^{1/4}$ (4) none of these

88. If $f(n+1)=\frac{2f(n)+1}{2}, n=1,2,...$ and $f(1)=2,$ then $f(101)$ equals

(1) 52 (2) 49

(3) 48 (4) 51

89. The number of solutions of the equation $a^{f(x)}+g(x)=0,\ a>0, g(x)\neq 0$ and has minimum value of $\frac{1}{2}$ is

(1) one (2) two

(3) zero (4) infinitely many

90. If $f:R\to R, g:R\to R$ be two given functions, then $f(x)=2\min\{1f(x)-g(x)|,0\}$ equals

(1) $f(x)+g(x)-|g(x)-f(x)|$

(2) $f(x)+g(x)+|g(x)-f(x)|$

(3) $f(x)-g(x)+|g(x)-f(x)|$

(4) $f(x)-g(x)-|g(x)-f(x)|$

91. If $f:R\to R$ satisfies

$f(x+y)=f(x)+f(y)$, for all $x,y\in R$

and $f(1)=7$, then $\sum_{r=1}^{n} f(r)$ is

(1) $\frac{7n}{2}$ (2) $\frac{7(n+1)}{2}$

(3) $7n(n+1)$ (4) $\frac{7n(n+1)}{2}$

ADDITIONAL SOLVED EXAMPLES

1. If $[x]^2-5[x]+6=6$, where [.] denote the greatest integer function , then

(1) $x\in[3,4)$ (2) $x\in[2,3]$

(3) $x\in\{2,3\}$ (4) $x\in[2,4)$

2. If $\left[\log\left(\frac{x}{[x]}\right)\right]\geq 0$, where [.] denote the greatest integer function , then

(1) $x\in(-\infty,\infty)\sim[0,1)$ (2) $(-\infty,0)$

(3) $(1,\infty)$ (4) none of these

3. Total number of positive real values of x satisfying $2[x]=x+\{x\}$, where [.] and {.} denote the greatest integer function and fractional part respectively, is equal to

(1) 2 (2) 1

(3) 0 (4) 3

4. Total number of solutions of $[x]^2=x+2\{x\}$, where [.] and {.} denotes the greatest integer function and fractional part respectively, is equal to

(1) 2 (2) 4

(3) 6 (4) none of these

5. Domain of $f(x)=\sqrt{\frac{x-1}{x-2\{x\}}}$, where {.} denotes the fractional part of x, is

(1) $(-\infty,0)\cup(0,2]$

(2) $[1,2)$

(3) $(-\infty,\infty)\sim[0,2)$

(4) $(-\infty,0)\cup(0,1]\cup[2,8)$

6. Domain of $f(x)=\sin^{-1}\left(\frac{[x]}{\{x\}}\right)$, where [.] and {.} denote the greatest integer function and fractional part respectively, is

(1) $(0,1)$ (2) $(-1,1)\sim\{0\}$

(3) $(-2,2)\sim\{-1,0,1\}$ (4) none of these

7. Domain of $f(x)=\sqrt{2\{x\}^2-3\{x\}+1}$, where {.} denotes the fractional part, in [–1, 1], is

(1) $[-1,1]\sim\left(\frac{1}{2},1\right)$

(2) $\left[-1,-\frac{1}{2}\right]\cup\left[0,\frac{1}{2}\right]\cup\{1\}$

(3) $\left[-1,\frac{1}{2}\right]$ (4) $\left[-\frac{1}{2},1\right]$

8. Domain of $f(x)=\sqrt{\cos(\sin x)}+\sqrt{\log_x\{x\}}$; where {.} denotes the fractional part, is

(1) $[1,\pi)$ (2) $(0,2\pi)\sim[1,\pi)$

(3) $\left(0,\frac{\pi}{2}\right)\sim\{1\}$ (4) $(0,1)$

9. If $\left[x^2\right]+x-a=0$ has a solution where $a\in N$ and $a\leq 20$, then total number of 'a' can be

(1) 2 (2) 3

(3) 4 (4) 6

10. If $\left[x+[2x]\right]<3$, where [.] denotes the greatest integer function, then

(1) $x\in[0,1)$ (2) $x\in\left[-\infty,\frac{3}{2}\right)$

(3) $x\in\left[0,\frac{3}{2}\right)$ (4) $x\in(-\infty,1)$

11. Domain of $f(x)=\sin^{-1}\left[2x^3-3\right]$, where [.] denotes the greatest integer function, is

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

(2) $\left[-\sqrt{\frac{3}{2}}, -1\right] \cup \left[1, \sqrt{\frac{3}{2}}\right) \cup \{1\}$

(3) $\left(-\sqrt{\frac{5}{2}}, \sqrt{\frac{5}{2}}\right)$

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

12. If $y = 3[x] + 1 = 4[x-1] - 10$, then $[x + 2y]$ is equal to
(1) 76 (2) 61
(3) 107 (4) 67

13. Domain of $f(x) = \sqrt{[x] - 1 + x^2}$; where [.] denotes the greatest integer function, is
(1) $(-\infty, -2) \cup [1, \infty)$
(2) $\left(-\infty, -\sqrt{2}\right] \cup [1, \infty)$
(3) $(-\infty, -3) \cup [1, \infty)$
(4) $\left(-\infty, -\sqrt{3}\right] \cup [1, \infty)$

14. The domain of
$f(x) = \sqrt{\sin^{-1}\left(3x - 4x^3\right)} + \sqrt{\cos^{-1} x}$ is equal to
(1) $\left[-1, -\frac{\sqrt{3}}{2}\right] \cup \left[0, \frac{\sqrt{3}}{2}\right]$
(2) $\left[-1, -\frac{1}{2}\right] \cup \left[0, \frac{1}{2}\right]$
(3) $\left[0, \frac{1}{2}\right]$ (4) none of these

15. Domain of $f(x)$ is $[-1, 2]$, then domain $f\left([x] - x^2 + 4\right)$ where [.] denotes the greatest integer function, is
(1) $\left[-1, \sqrt{7}\right]$
(2) $\left[-\sqrt{3}, -1\right] \cup \left[\sqrt{3}, \sqrt{7}\right]$
(3) $\left(-1, \sqrt{7}\right]$
(4) $\left[-\sqrt{3}, -1\right) \cup \left[\sqrt{3}, \sqrt{7}\right]$

16. Range of $f(x) = [|\sin x| + |\cos x|]$, where [.] denotes the greatest integer function, is
(1) $\{0\}$ (2) $\{0, 1\}$
(3) $\{1\}$ (4) none of these

17. Range of $f(x) = \sin^{-1} x + \tan^{-1} x + \cos^{-1} x$ is
(1) $\left(0, \frac{3\pi}{2}\right)$ (2) $\left(\frac{\pi}{2}, \frac{3\pi}{2}\right)$
(3) $\left(-\frac{\pi}{2}, \frac{3\pi}{4}\right)$ (4) $\left(\frac{\pi}{4}, \frac{3\pi}{4}\right)$

18. Range of $\sin^{-1}\left[x^2 + \frac{1}{2}\right] + \cos^{-1}\left[x^2 - \frac{1}{2}\right]$ where [.] denotes the greatest integer function, is
(1) $\left\{\frac{\pi}{2}, \pi\right\}$ (2) $\{\pi\}$
(3) $\left\{\frac{\pi}{2}\right\}$ (4) none of these

19. Range of $f(x) = \sin^{-1}\left(\sqrt{x^2 + x + 1}\right)$ is
(1) $\left(0, \frac{\pi}{2}\right]$ (2) $\left(0, \frac{\pi}{3}\right]$
(3) $\left[\frac{\pi}{3}, \frac{\pi}{2}\right]$ (4) $\left[\frac{\pi}{6}, \frac{\pi}{3}\right]$

20. The minimum value of
$f(x) = |x-1| + |x-2| + |x-3|$ isequal to
(1) 1 (2) 2
(3) 3 (4) zero

21. Range of $f(x)=\frac{e^x}{[x+1]}, x\geq 0$ is

(1) $(0,\infty)$ (2) $[0,\infty)$

(3) $(1,\infty)$ (4) $[1,\infty)$

22. Range of $f(x)=[1+\sin x]+[\cos x-1]+[\tan^{-1}x]\forall x\in[0,2\pi]$ is (where [.] denotes the greatest integer function)

(1) $\{-1,1,2\}$ (2) $\{-1,0,1\}$

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

23. Range of $f(x)=[1+\sin x]+\left[2+\sin\frac{x}{2}\right]+\left[3+\sin\frac{x}{3}\right]+...+\left[n+\sin\frac{x}{n}\right]\forall x\in[0,\pi]$, where [.] denotes the greatest integer function, is

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

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

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

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

24. $f:[-4,4]\sim\{-\pi,0,\pi\}\to R$, where $f(x)=\cot(\sin x)+\left[\frac{x^2}{|a|}\right]$, where [.] denotes the greatest integer function, is an odd function.Complete set of values of 'a' is

(1) $(-16,16)\sim\{0\}$

(2) $(-\infty,16)\cup(16,\infty)$

(3) $[-16,16]\sim\{0\}$

(4) $(-\infty,-16]\cup[16,\infty)$

25. period of $f(x)=\sin^{-1}(\sin x)+e^{\tan x}$ is

(1) 2π (2) π

(3) $\frac{\pi}{2}$ (4) none of these

26. Which of the following functions is non - periodic ?

(1) $\frac{2^x}{2^{[x]}}$ (2) $\sin^{-1}(\{x\})$

(3) $\sin^{-1}(\sqrt{\cos x})$ (4) $\sin^{-1}(\cos(x^2))$

27. If 'f' be a periodic function, then

(1) 'f' has to be bounded

(2) 'f' has to be onto

(3) 'f' has to be into

(4) 'f' may not be bounded

28. Period of $f(x)=x-[x+a]-b$, where $a,b\in R$ and [.] denotes the greatest integer function, is

(1) a (2) b

(3) $|a-b|$ (4) 1

29. period of $f(x)=\sin 3\pi\{x\}+\tan\pi[x]$, where [.] and {.} denote the greatest integer function and fractional part respectively, is

(1) 1 (2) 2

(3) 3 (4) none of these

30. Period of $f(x)=[x]+[2x]+[3x]+[4x]+...+[nx]-\frac{n(n+1)}{2}x$ where $n\in N$, is

(1) n (2) 1

(3) $\frac{1}{n}$ (4) none of these

31. Total number of solutions of $2^{\cos x}=|\sin x|$ in $[-2\pi,5\pi]$ is equal to

(1) 12 (2) 14

(3) 16 (4) 15

32. Let $A=\{x_1,x_2,.....,x_m\}$, $B=\{y_1,y_2,.....,y_n\}$, then total number of non-empty relations that can be defined from A to B, is

(1) m^n-1 (2) n^m-1

(3) $mn-1$ (4) $2^{mn}-1$

33. $f:R\to R$ where $f(x)=\dfrac{x^2+3x+6}{x^2+x+1}$, then $f(x)$ is

(1) many-one and into (2) many-one and onto

(3) one-one and into (4) one-one and onto

34. $f:N\to N$ where $f(x)=x-(-1)^x$, then 'f' is

(1) one-one and into (2) many-one and into

(3) one-one and onto (4) many-one and onto

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

(1) $(-\infty,\infty)$ (2) $(-\infty,0)$

(3) $(0,\infty)$ (4) none of these

36. If $f(x)=\max imum\left\{x^3,x^2,\dfrac{1}{64}\right\}$ $\forall x\in[0,\infty)$, then

(1) $f(x)=\begin{cases}x^2, & 0\le x\le 1\\ x^3, & x>1\end{cases}$

(2) $f(x)=\begin{cases}\dfrac{1}{64}, & 0\le x\le\dfrac{1}{4}\\ x^2, & \dfrac{1}{4}<x\le 1\\ x^3, & x>1\end{cases}$

(3) $f(x)=\begin{cases}\dfrac{1}{64}, & 0\le x\le\dfrac{1}{8}\\ x^3, & \dfrac{1}{8}<x\le 1\\ x^3, & x>1\end{cases}$

(4) $f(x)=\begin{cases}\dfrac{1}{64}, & 0\le x\le\dfrac{1}{8}\\ x^3, & x>\dfrac{1}{8}\end{cases}$

37. Total number of solutions $2^x+3^x+4^x-5^x=0$ is/are

(1) 1 (2) 2

(3) 3 (4) none of these

38. Let $f_1(n)=1+\dfrac{1}{2}+\dfrac{1}{3}+....+\dfrac{1}{n}$, then $f_1(1)+f_1(2)+f_1(3)+...+f_1(n)$ is equal to

(1) $nf_1(n)-1$ (2) $(n+1)f_1(n)-n$

(3) $(n+1)f_1(n)+n$ (4) $nf_1(n)+n$

39. Let $f(x)=x^2+3x-3,\ x\ge 0$. If n points $x_1,x_2,x_3,....x_n$ are so chosen on the x-axis such that *(i)* $\dfrac{1}{n}\sum_{i=1}^{n}f^{-1}(x_1)=f\left(\dfrac{1}{n}\sum_{i=1}^{n}x_i\right)$

(ii) $\dfrac{1}{n}\sum_{i=1}^{n}f^{-1}(x_i)=\sum_{i=1}^{n}x_i$, where f^{-1} denotes the inverse of f. then the A.M of x_i '*s is*

(1) 1 (2) 2

(3) 3 (4) 4

40. Consider a function $f(n)$ defined for all $n\in N$. The function satisfies the following two conditions

(i) $f(1)+f(2)+f(3)+...to\infty=1.$

(ii) $f(n)=\{(1-p)p^{-1}\}\{f(n+1)+f(n+2)+...to\infty\}$, where $0<p<1$. then $f(2)$, is equal to

(1) $p(1-p)$ (2) $1-p$

(3) $1+p$ (4) none of these

ASSIGNMENT

1. The domain of the function
$f(x)={}^{24-x}C_{3x-1}+{}^{40-6x}C_{8x-10}$ is
(1) $\{2, 3\}$ (2) $\{1, 2, 3\}$
(3) $\{1, 2, 3, 4\}$ (4) None of these

2. The domain of the function
$f(x)=\cos^{-1}\left(\frac{1-|x|}{2}\right)$
(1) $(-\infty,-3)\cup(3,\infty)$ (2) [–3, 3]
(3) $(-\infty,-3)\cup[3,\infty)$ (4) ϕ

3. The domain of the function
$f(x)=\sqrt{e^{\sin^{-1}\left(\log_{16}x^2\right)}}$ is
(1) $\left[\frac{1}{4},4\right]$
(2) $\left[-4,-\frac{1}{4}\right]\cup\left[\frac{1}{4},4\right]$
(3) $\left[-4,-\frac{1}{4}\right]$
(4) none of these

4. The domain of the function
$f(x)=\log_{\left[x+\frac{1}{2}\right]}|x^2-5x+6|$ is
(1) $\left[\frac{3}{2},2\right)\cup(2,3)\cup(3,\infty)$
(2) $\left[\frac{3}{2},\infty\right)$
(3) $\left[\frac{1}{2},\infty\right)$
(4) none of these

5. The domain of the function
$f(x)=\cos^{-1}(x+[x])$, where [.] denotes the greatest integer function, is
(1) [–1, 1] (2) [0, 1)
(3) (–1, 0) (4) none of these

6. The domain of the function
$f(x)=\underbrace{\log_2\log_2\log_2.....\log_2 x}_{n\ times}$ is
(1) $\left(2^{n-2},\infty\right)$ (2) $\left[2^{n-2},\infty\right)$
(3) $\left(2^{n-2},\infty\right)$ (4) none of these

7. The domain of the function
$f(x)=\sqrt{x-3-3\sqrt{x-4}}-\sqrt{x-3+2\sqrt{x-4}}$
is
(1) $[4,\infty)$ (2) $(-\infty,4]$
(3) $(4,\infty)$ (4) $(-\infty,4)$

8. The domain of the function
$f(x)=\cos\left[\log\left(\frac{\sqrt{16-x^2}}{3-x}\right)\right]$ is
(1) (–4, 4) (2) (–4, 3)
(3) $(-\infty,-4)\cup(3,\infty)$
(4) none of these

9. The domain of the function
$f(x)=\frac{3+2(x+25)^{-0.5}}{5-(x+25)^{0.5}}+(x-5)^{0.5}+(x-3)^{0.5}$ is
(1) $[5,\infty)$ (2) $[3,\infty)$
(3) (–25, 5) (4) none of these

10. The domain of the function
$f(x)=\sqrt[4]{\log_3\left(\frac{1}{|\cos x|}\right)}$ is
(1) $(-\infty,\infty)$
(2) $(-\infty,\infty)-\{n\pi+n\in I\}$

(3) $(-\infty,\infty)-\left\{(2n+1)\frac{\pi}{2}:n\in I\right\}$

(4) none of the above

11. The domain of the function

$f(x)=\log_3\left[-\log_{1/2}\left(1+\frac{1}{x^{1/5}}\right)-1\right]$ is

(1) $(-\infty,\infty)$ (2) (0, 1)

(3) $(1,\infty)$ (4) none of these

12. The domain of the function

$f(x)=\log_3\left[-(\log_3 x)^2+5\log_3 x-6\right]$

(1) $(0,9)\cup(27,\infty)$ (2) [9, 27]

(3) (9, 27) (4) none of these

13. The domain of the function $f(x)=x^{\frac{1}{\log x}}$ is

(1) $(0,\infty)-\{1\}$ (2) $(0,\infty)$

(3) $[0,\infty)$ (4) $[0,\infty)-\{1\}$

14. The domain of the function $f(x)=\sqrt{\frac{4-x^2}{[x]+2}}$,

where [x] denotes the greatest integer less than or equal to x, is

(1) [–1, 2] (2) $(-\infty,-2)$

(3) $(-\infty,-2)\cup[-1,2]$ (4) none of these

15. The domain of the function $f(x)=\log_{\left[x+\frac{1}{2}\right]}|x^2-x-6|$ where [.] denotes the greatest integer function, is :

(1) $\left(\frac{3}{2},3\right)\cup(3,\infty)$ (2) $\left[\frac{3}{2},3\right)\cup(3,\infty)$

(3) $\left[\frac{3}{2},3\right)$ (4) none of these

16. If $f(x)$ is defined on (0, 1), then the domain of definition of $f(e^x)+f(1n|x|)$ is :

(1) $(-e,-1)$ (2) $(-e,1)$

(3) $(-\infty,-1)\cup(1,\infty)$ (4) $(-e,e)$

17. $f(x)=\frac{\sqrt{|\tan x|+\tan x}}{\sqrt{3x}}$ is defined for :

(1) R (2) $R-\left\{\frac{1}{3}\right\}$

(3) $R-\left\{n\pi+\frac{\pi}{2}\middle|n\in I^+\right\}$ (4) none of these

18. The function $f(x)=\log_{10}\left(\frac{5x-x^2}{4}\right)$ exists for :

(1) $[1,4]$ (2) $[1,0]$

(3) $[0,5]$ (4) $[5,0]$

19. Domain of definition of the function

$f(x)=\frac{3}{4-x^2}+\log_{10}(x^3-x)$, is

(1) $(1,2)$

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

(3) $(1,2)\cup(2,\infty)$

(4) $(-1,0)\cup(1,2)\cup(2,\infty)$

20. Let $f(x)=[x]^2+[x+1]-3$, where [.] denotes the greatest integer function, then :

(1) $f(x)\neq 0$ for all real x

(2) $f(x)=0$ for only two real values

(3) $f(x)=0$ for infinite number of values of x

(4) none of the above

21. Let f be a function defined on $[-2,2]$ and is given by $f(x)=\begin{cases}-1, & -2\le x\le 0\\ x-1, & 0<x\le 2\end{cases}$ and

$g(x)=f(|x|)+|f(x)|$. then $g(x)$ is equal

to :

(1) $\begin{cases} -x, & -2 \le x < 0 \\ 0, & 0 \le x \le 1 \\ x-1, & 1 \le x \le 2 \end{cases}$

(2) $\begin{cases} -x, & -2 \le x < 0 \\ 0, & 0 \le x < 1 \\ 2(x-1), & 1 \le x \le 2 \end{cases}$

(3) $\begin{cases} -x, & -2 \le x < 0 \\ x-1, & 0 \le x \le 2 \end{cases}$ (4) none of these

22. If $f(x) = \sin[\pi^2]x + \sin[-\pi^2]x$, where [.]denotes the greatest integer function, then :

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

(3) $f\left(\frac{\pi}{4}\right) = 1$ (4) none of these

23. The domain of the definition of the function $y(x)$ given by the equation $2^x + 2^y = 2$ is

(1) $0 < x \le 1$ (2) $0 \le x \le 1$

(3) $-\infty < x \le 0$ (4) $-\infty < x < 0$

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

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

(3) $f(-\pi) = 0$ (4) $f\left(\frac{\pi}{4}\right) = 2$

25. The domain of definition of the function

$f(x) = \sqrt[3]{\frac{2x+1}{x^2-10x-11}}$ is given by :

(1) $x > 0$ (2) $R - \{-1, 11\}$

(3) $x \ne -1, x \ne 11$ (4) $-\infty < x < \infty$

26. The domain of the function

$f(x) = \cot^{-1}\left(\frac{x}{\sqrt{x^{2-}[x^2]}}\right)$, $x \in R$ is :

(1) $R - \{\pm\sqrt{n}, n \in N\}$

(2) $R - \{\sqrt{n}, n \ge 0, n \in N\}$

(3) R (4) R – {0}

27. For areal number x, [x] denotes the integral part of x. The value of

$\left[\frac{1}{2}\right] + \left[\frac{1}{2} + \frac{1}{100}\right] + \left[\frac{1}{2} + \frac{2}{100}\right] + \ldots + \left[\frac{1}{2} + \frac{99}{100}\right]$

is :

(1) 49 (2) 50

(3) 48 (4) 51

28. The range of the function $f(x) = \sin x - \cos x$ is :

(1) $(-\sqrt{2}, \sqrt{2})$ (2) $[-\sqrt{2}, \sqrt{2}]$

(3) $[0, \sqrt{2}]$ (4) none of these

29. The range of the function $f(x) = \frac{x}{|x|}$ is

(1) $R - \{0\}$ (2) $R - \{-1, 1\}$

(3) $\{-1, 1\}$ (4) none of these

30. The range of the function

$f(x) = \sin\left[\log\left(\frac{\sqrt{4-x^2}}{1-x}\right)\right]$ is

(1) $[0, 1]$ (2) $(-1, 0)$

(3) $[-1, 1]$ (4) $(-1, 1)$

31. The range of the function $f(x) = \frac{5}{3-x^2}$ is :

(1) $(-\infty, 0) \cup \left[\frac{5}{3}, \infty\right)$ (2) $(-\infty, 0) \cup \left(\frac{5}{3}, \infty\right)$

(3) $(-\infty,0]\cup\left[\frac{5}{3},\infty\right)$ (4) none of these

32. The image of the interval $[1,3]$ under the mapping $f:R\to R$, given by $f(x)=2x^3-24x+107$ is :

(1) $[0,89]$ (2) $[75,89]$

(3) $[0,75]$ (4) none of these

33. If $f(x)=\frac{x^2-1}{x^2+1}$, for every real number x, then the minimum value of f:

(1) does not exist because f is unbounded

(2) is not attained even though f is bounded

(3) is equal to 1 (4) is equal to –1

34. The number of values of x, where the function $f(x)=\cos x+\cos\left(\sqrt{2}x\right)$ attains its maximum, is :

(1) 0 (2) 1

(3) 2 (4) infinite

35. The range of the real function $\frac{x+2}{x^2-8x-4}$ is :

(1) $\left(-\infty,-\frac{1}{4}\right]\cup\left[-\frac{1}{20},\infty\right)$

(2) $\left(-\infty,-\frac{1}{4}\right)\cup\left(-\frac{1}{20},\infty\right)$

(3) $\left(-\infty,-\frac{1}{4}\right]\cup\left(-\frac{1}{20},\infty\right)$

(4) none of these

36. The range of the function $f(x)=\frac{x^2-x}{x^2+2x}$ is

(1) $R/\left\{1,-\frac{1}{2}\right\}$ (2) R

(3) $R/\{1\}$ (4) none of these

37. The range of the function $f(x)=\frac{x+2}{|x+2|}, x\neq -2$ is :

(1) $\{-1,1\}$ (2) $\{-1,0,1\}$

(3) {1} (4) $(0,\infty)$

38. The minimum value of $2^{\left(x^2-3\right)^3+27}$ is :

(1) 1 (2) 2

(3) 2^{27} (4) none of these

39. Let $f(x)=\left(1+b^2\right)x^2+2bx+1$ and m(b) the minimum value of $f(x)$ for a given b.As b varies, the range of m(b) is :

(1) $[0,1]$ (2) $\left(0,\frac{1}{2}\right]$

(3) $\left[\frac{1}{2},1\right]$ (4) $(0,1]$

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

(1) $\frac{-1\pm\sqrt{5}}{2}$ (2) $\frac{-3\pm\sqrt{5}}{2}$

(3) $\frac{-2\pm\sqrt{5}}{2}$ (4) none of these

41. The function $f(x)=\sec\left[\log\left(x+\sqrt{1+x^2}\right)\right]$ is :

(1) even (2) odd

(3) constant (4) non of these

42. Let the function $f(x)=3x^2-4x+8\log(1+|x|)$ be defined on the interval $[-1,1]$ is :

(1) $3x^2+4x+8\log(1+|x|)$

(2) $3x^2-4x+8\log(1+|x|)$

(3) $3x^2-4x-8\log(1+|x|)$

(4) none of the above

43. Which of the following functions is odd ?

(1) $\text{sgn } x + x^{2000}$ (2) $|x| - \tan x$

(3) $x^3 \cot x$ (4) $\cos ec\ x^{55}$

44. The period of the function $f(x) = \sin\sqrt{x}$ is

(1) π (2) 2π

(3) $\frac{\pi}{2}$ (4) none of these

45. Let $f(x) = \cos\sqrt{px}$, where $p = [a] =$ the greatest integer less than or equal to a. If the fundamental period of $f(x)$ is π ,then :

(1) $a \in [4,5]$ (2) $a = \{4,5\}$

(3) $a \in [4,5)$ (4) none of these

46. The period of the function $f(x) = \sqrt{\tan x}$ is :

(1) π (2) 2π

(3) $\frac{\pi}{2}$ (4) none of these

47. The period of the function $f(x) = \cos\left(\frac{8x+5}{4\pi}\right)$:

(1) 2π (2) π

(3) π^2 (4) none of these

48. The period of the function $f(x) = x - [x]$, where $[x]$ denotes the greatest integer less than or equal to x, is :

(1) 2 (2) 1

(3) 4 (4) none of these

49. If T_1 is the period of the function $y = e^{3(x-[x])}$ and T_2 is the period of the function $y = e^{3x-[3x]}$ ([.] denotes the greatest integer function), then :

(1) $T_1 = T_2$ (2) $T_1 = \frac{T_2}{3}$

(3) $T_1 = 3T_2$ (4) none of these

50. If $e^x + e^{f(x)} = e$, then range of the function f is :

(1) $(-\infty,1]$ (2) $(-\infty,1)$

(3) $(\infty,1)$ (4) $[1,\infty)$

51. If the period of the function $f(x) = \sin\left(\sqrt{[n]x}\right)$, where [n] denotes the greatest integer less than or equal to n, is 2π, then :

(1) $1 \le n < 2$ (2) $1 < n < 2$

(3) $1 \le n \le 2$ (4) none of these

52. The period of the function

$f(x) = \cos\left(\frac{\pi x}{n!}\right) - \sin\left(\frac{\pi x}{(n+1)!}\right)$ is :

(1) $2(n+1)!$ (2) $2(n)!$

(3) $(n+1)$ (4) not periodic

53. The function $f(x) = k|\cos x| + k^2|\sin x| + \phi(k)$ has period $\frac{\pi}{2}$, if k is equal to :

(1) 1 (2) 2

(3) 3 (4) none of these

54. The period of the function $3^{(\sin^2\pi x + x - [x] + \sin^4\pi x)}$, where[.]denotes the greatest integer function, is :

(1) $\frac{1}{2}$ (2) 1

(3) 2 (4) none periodic

55. The period of the function $f(x) = 2\sin x + 3\cos 2x$ is

(1) π (2) 2π

(3) $\frac{\pi}{2}$ (4) none of these

56. The period of the function $f(x) = \begin{cases} 1, when\ x\ is\ a\ rational \\ 0, when\ x\ is\ an\ irrational \end{cases}$ is

(1) 1 (2) 2
(3) non-periodic (4) none of these

57. The period of the function $f(x)=\cos\frac{2\pi x}{5}+\sin\frac{\pi x}{4}$ is :
(1) 5 (2) 8
(3) 12 (4) 40

58. Let f be a real valued function with domain R satisfying
$f(x+k)=1+[2-5f(x)+10\{f(x)\}^2-10\{f(x)^3+5\{f(x)\}^4-\}\{f(x)\}^5]^{1/5}$ for all real x and some positive constant k, then the period of the function $f(x)$ is :
(1) k (2) $2k$
(3) non periodic (4) none of these

59. If the period of the function $f(x)=\tan\left(\sqrt{[k]}x\right)$, where [.] denotes the greatest integer function, is π, then
(1) $1<k<2$ (2) $1\le k<2$
(3) $k=1,2$ (4) none of these

60. The period of the function $f(x)=\sin 5x+\cos\sqrt{3}x$ is
(1) $\sqrt{3}\pi$ (2) π
(3) non-periodic (4) none of these

61. The period of the function
$f(x)=3x+3-[3x+3]+\sin\frac{\pi x}{2}$, where $[x]$ denotes the greatest integer $\le x$, is :
(1) 4 (2) 1
(3) 2 (4) non periodic

62. The value of $n\in I$ for which the function $f(x)=\frac{\sin nx}{\sin\left(\frac{x}{n}\right)}$ has 4π as its period, is :
(1) 2 (2) 3
(3) 4 (4) 5

63. π is the period of the function :
(1) $|\sin x|+|\cos x|$ (2) $\sin^4 x+\cos^4 x$
(3) $\sin(\sin x)+\sin(\cos x)$
(4) $\frac{1+2\cos x}{\sin x(2+\sec x)}$

64. which of the following functions is non-periodic ?
(1) $f(x)=\tan(3x-2)$
(2) $f(x)=\{x\}$, the fractional part of the number x
(3) $f(x)=x+\cos x$
(4) $f(x)=1-\frac{\cos^2 x}{1+\tan x}-\frac{\sin^2 x}{1+\cot x}$

65. The period of the function
$f(x)=\frac{\sin 8x\cos x-\sin 6x\cos 3x}{\cos 2x\cos x-\sin 3x\sin 4x}$ is :
(1) π (2) $\frac{\pi}{2}$
(3) 2π (4) none of these

66. The period of the function
$f(x)=\frac{\sin x+\sin 2x+\sin 4x+\sin 5x}{\cos x+\cos 2x+\cos 4x+\cos 5x}$ is:
(1) $\frac{\pi}{3}$ (2) $\frac{\pi}{4}$
(3) π (4) none of these

67. Let f be a real valued function with domain R satisfying $0\le f(x)\le\frac{1}{2}$ and for some fixex a,
$f(x+a)=\frac{1}{2}\sqrt{f(x)-(f(x))^2}\ \forall\ x\in R$,
then the period of the function $f(x)$ is
(1) a (2) $2a$
(3) non-periodic (4) none of these

68. If $f(x)$ is an odd periodic function with period 2, then $f(4)$ equals
(1) – 4 (2) 4
(3) 2 (4) 0

69. If $f(x)=\sqrt{2-x}$ and $g(x)=\sqrt{1-2x}$, then the domain of $f[g(x)]$ is

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

(3) $\left[-\infty,-\frac{3}{2}\right)$ (4) none of these

70. Let f be a function with domain [–3, 5] and let $g(x)=|3x+4|$. Then the domain of $(fog)(x)$ is

(1) $\left(-3,\frac{1}{3}\right)$ (2) $\left[-3,\frac{1}{3}\right]$

(3) $\left[-3,\frac{1}{3}\right)$ (4) none of these

71. IF $f(x)=\frac{x-1}{x+1}$ then $f(f(ax))$ in terms of $f(x)$ is equal to

(1) $\frac{f(x)-1}{a(f(x)+1)}$ (2) $\frac{f(x)+1}{a(f(x)-1)}$

(3) $\frac{f(x)-1}{a(f(x)+1)}$ (4) $\frac{f(x)+1}{a(f(x)+1)}$

72. If f, g, h are function from R to R such that $f(x)=x^2-1$, $g(x)=\sqrt{x^2+1}\ \forall x\in R$ and $h(x)=\begin{cases}0, & x\le 0\\ x, & x\ge 0\end{cases}$ then the composition function $ho(fog)$ is given by

(1) x^2 (2) 0

(3) x (4) none of these

73. If $f(x)=\cos(\log x)$, then

$f(x).f(y)-\frac{1}{2}\left\{f\left(\frac{x}{y}\right)+f(xy)\right\}$ is equal to

(1) 2 (2) 1

(3) 0 (4) none of thee

74. If $f(x)=(3-x^7)^{1/7}\ \forall\ x\in R$, then $(fof)(x)$ is equal to

(1) x (2) 0

(3) $3-x^7$ (4) none of these

75. If $f(x)=\frac{1}{1-x}, g(x)=f[f(x)]$ and $h(x)=f[f\{f(x)\}]$, then the value of $f(x).g(x).h(x)$ is

(1) 1 (2) – 1

(3) 0 (4) none of these

76. If $g[f(x)]=|\sin x|$ and $f[g(x)]=(\sin\sqrt{x})^2$, then

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

(2) $f(x)=\sin x, g(x)=|x|$

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

(4) f and g cannot be determined

77. If $f(x)=|x-2|$ and $g(x)=g[f(x)]$, then for $x > 20$, $g'(x)$ is equal to

(1) –1 (2) 1

(3) 2 (4) none of these

78. If the function f, g, h are defined from the set of real numbers R to R such that

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

$h(x)=\begin{cases}0, & if\ x\le 0\\ x, & if\ x\ge 0\end{cases}$ then the composite function $(hofog)(x)$ is equal to

(1) $\begin{cases}0, & x=0\\ x^2, & x>0\\ -x^2, & x<0\end{cases}$ (2) $\begin{cases}0, & if\ x=0\\ x^2, & if\ x\ne 0\end{cases}$

(3) $\begin{cases}0, & x\le 0\\ x^2, & x>0\end{cases}$ (4) none of these

79. If $A=\left\{x:-\frac{3}{5}\le x\le\frac{\pi-2}{5}\right\}$, $B=\{y:-1\le y\le 1\}$
(1) one-one but not onto
(2) onto but not one-one
(3) both one-one and onto
(4) neither one-one nor onto

80. The function $f:R\to[0,1)$, defined $f(x)=x[x],\ \forall x\in R$ is
(1) one-one (2) onto
(3) both one-one and onto
(4) neither one-one nor onto

81. The function $f:R\to R$ defined by $f(x)=4^x+4^{|x|}$ is
(1) one-one and into (2) many-one and into
(3) one-one and onto (4) many-one and onto

82. Let $f:R\to R$ be a function defined $f(x)=\frac{x^2-8}{x^2+2}$, then f is
(1) one-one but not onto
(2) one-one and onto
(3) onto but not one-one
(4) neither one-one nor onto

83. Let $f:R\to R$ be a function defined by $f(x)=x+\sqrt{x^2}$, then f is
(1) injective (2) surejective
(3) bijective (4) none of these

84. Let $f:(-\infty,2]\to(-\infty,2]$ be a function defined by $f(x)=4x-x^2$. Then $f^{-1}(x)$ is
(1) $2-\sqrt{4-x}$ (2) $2+\sqrt{4-x}$
(3) $\sqrt{4-x}$ (4) none of these

85. Let $f:[4,\infty)\to[4,\infty)$ be a function defined by $f(x)=5^{x(x-4)}$, then $f^{-1}(x)$ is
(1) $2-\sqrt{4+\log_5 x}$ (2) $2+\sqrt{4+\log_5 x}$
(3) $\left(\frac{1}{5}\right)^{x(x-4)}$ (4) none of these

86. If $f:R\to R$ is given by $f(x)=3x-5$, then $f^{-1}(x)$
(1) is given by $f^{-1}(x)\frac{1}{3x-5}$
(2) is given by $\frac{x+5}{3}$
(3) does not exist because f is not one-one
(4) does not exist because f is not onto

87. Let $f:R\to R$ be given by $f(x)=(x+1)^2-1, x\ge-1$. Then $f^{-1}(x)$, is
(1) $-1+\sqrt{x+1}$ (2) $-1-\sqrt{x+1}$
(3) does not exist because f is not one-one
(4) does not exist because of f is onto

88. Let $f:R\to R$ be given by $f(x)=(x+1)^1-1,\ x\ge-1$. Then, the set of values of x for which $f(x)=f^{-1}(x)$ is given by
(1) { 0 } (2) { 0, 1 }
(3) { – 1 } (4) none of these

89. Let $f:R\to R$ be a function defined by $f(x)=x-[x]$, where [.] denotes the greatest integer function, then $f^{-1}(x)$ is
(1) $[x]-x$ (2) $\frac{1}{x-[x]}$
(3) not defined (4) none of these

90. The inverse of the function $y=\frac{10^x-10^{-x}}{10^x+10^{-x}}+1$
(1) $y=\frac{1}{2}\log_{10}\frac{x}{2-x}$ (2) $y=\log_{10}\frac{x}{2-x}$
(3) $y=\frac{1}{2}\log_{10}\frac{x}{1-x}$ (4) none of these

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

(1) $\log_3\left(\frac{x-1}{x+1}\right)^{-2}$ (2) $\log_e\left(\frac{x-2}{x+1}\right)^{1/2}$

(3) $\log_e\left(\frac{x}{2-x}\right)^{1/2}$ (4) $\log_3\left(\frac{x+1}{3-x}\right)^{1/2}$

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

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

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

93. $f(x+y,x-y)=xy$, then the arithmetic mean of $f(x,y)$, and $f(y,x)$ is

(1) y (2) x
(3) 0 (4) none of these

94. If $f(x)=64x^3+\frac{1}{x^3}$ and a, b are the roots of $4x+\frac{1}{x}=3$, then :

(1) $f(a)=12$ (2) $f(b)=11$

(3) $f(a)=f(b)$ (4) none of these

95. If $3f(x)+5f\left(\frac{1}{x}\right)=\frac{1}{x}-3,\ \forall x(\neq 0)\in R,$ then $f(x)$ is equal to

(1) $\frac{1}{14}\left(\frac{3}{x}+5x-6\right)$ (2) $\frac{1}{14}\left(-\frac{3}{x}+5x-6\right)$

(3) $\frac{1}{14}\left(-\frac{3}{x}+5x+6\right)$ (4) none of these

96. If $f(x+y)=f(x)+f(y)-1$ for all $x,y\in R$ and $f(1)=1$, then the number of solutions of $f(n)=n, n\in N$ is

(1) one (2) two
(3) no solution (4) none of these

97. Let $f(x)=\max.\ \{(1-x),(1+x),2\},$ $\forall x\in R$. Then

(1) $f(x)=\begin{cases}1+x, & x\le -1\\ 2, & -1<x<1\\ 1-x, & x\ge -1\end{cases}$

(2) $f(x)=\begin{cases}1-x, & x\le -1\\ 1, & -1<x<1\\ 1+x, & x\ge 1\end{cases}$

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

(4) none of the above

98. The distinct linear function(s) which map(s) [–1, 1] onto [0, 2] is/are

(1) $x+1, -x+1$ (2) $x-1, x+1$
(3) $-x+1$ (4) none of these

99. If $f(x)=\frac{4^x}{4^x+2}$, then

$f\left(\frac{1}{1997}\right)+f\left(\frac{2}{1997}\right)+.....+f\left(\frac{1996}{1997}\right)$ is equal to

(1) 1997 (2) 998
(3) 0 (4) none of these

100. The value of the natural number a for which $\sum_{k=1}^{n} f(a+k)=16\left(2^n-1\right)$, where the function f satisfies the relation $f(x+y)=f(x).f(y)$ for all natural nmbers x, y and further $f(1)=2$, is

(1) 3 (2) 4
(3) 2 (4) none of these

ENTRANCE CORNER

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

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

(2) $f^{-1}(f(A))=A$ only if $f(x)=y$

(3) $f(f^{-1}(B))=B$ only if $fB\subseteq f(x)$

(4) $f(f^{-1}(B))=B$

2. $f(x)=\begin{cases}x, & if\ x\ is\ rational\\ 0, & if\ x\ irrational\end{cases}$ and

$g(x)=\begin{cases}0, & if\ x\ is\ rational\\ x, & if\ x\ irrational\end{cases}$, then fg is

(1) one-one and into
(2) neither one-one nor onto
(3) many one and onto
(4) one-one and onto

3. The second degree polynomial $f(x)$, satisfying $f(0)=0,\ f(1)=1, f'(x)>0$ for all $x\in(0,1)$

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

(2) $f(x)=ax+(1-a)x^2;\forall a\in(0,\infty)$

(3) $f(x)=ax+(1-a)x^2, a\in(0,2)$

(4) no such polynomial

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

(1) $\left[0,\frac{\pi}{2}\right]$ (2) $\left[-\frac{\pi}{4},\frac{\pi}{4}\right]$

(3) $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$ (4) $[0,\pi]$

5. Domain of definition of the function

$f(x)=\sqrt{\sin^{-1}(2x)+\frac{\pi}{6}}$, for real values of x, is

(1) $\left[-\frac{1}{4},\frac{1}{2}\right]$ (2) $\left[-\frac{1}{2},\frac{1}{2}\right]$

(3) $\left(-\frac{1}{2},\frac{1}{9}\right)$ (4) $\left[-\frac{1}{4},\frac{1}{4}\right]$

6. Range of the function $f(x)=\frac{x^2+x+2}{x^2+x+1}; x\in R$ is

(1) $(1,\infty)$ (2) $\left(1,\frac{11}{7}\right]$

(3) $\left(1,\frac{7}{3}\right]$ (4) $\left(1,\frac{7}{5}\right]$

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

(1) one-one and onto
(2) one-one but not onto
(3) onto but not one-one
(4) neither one-one nor onto

8. 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

(1) $-\sqrt{x}-1, x\geq 0$ (2) $\frac{1}{(x+1)^2}, x>-1$

(3) $\sqrt{x+1}, x\geq -1$ (4) $\sqrt{x}-1, x\geq 0$

9. The domain of the derivative of the function

$f(x)=\begin{cases}\tan^{-1}x, & |x|\le 1\\ \frac{1}{2}(|x|-1), & |x|>1\end{cases}$ is

(1) R – { 0 } (2) R – { 1 }

(3) R – { –1 } (4) R – { –1, 1 }

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

(1) one-one and onto

(2) one-one but not onto

(3) onto but not one-one

(4) neither one-one nor onto

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

(1) $\frac{x+\sqrt{x^2-4}}{2}$ (2) $\frac{x}{1+x^2}$

(3) $\frac{x-\sqrt{x^2-4}}{2}$ (4) $1+\sqrt{x^2-4}$

12. Let E = {1, 2, 3, 4 } and F = { 1, 2 }. Then the number of onto function from E to F is

(1) 14 (2) 16

(3) 12 (4) 8

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

(1) $\sqrt{2}$ (2) $-\sqrt{2}$

(3) 1 (4) –1

14. 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

(1) x (2) 1

(3) $f(x)$ (4) $g(x)$

15. Let $f(x)=(1+b^2)x^2+2bx+1$ and $m(b)$ the minimum value of $f(x)$ for a given b. As b varies, the range of $m(b)$ is

(1) [0, 1] (2) $\left(0,\frac{1}{2}\right]$

(3) $\left[\frac{1}{2},1\right]$ (4) (0, 1]

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

(1) R – {–1, –2 } (2) $(-2,\pm\infty)$

(3) R – {–1, –2, –3} (4) $(-3,\infty)-\{-1,-2\}$

17. Let $f(\theta)=\sin\theta(\sin\theta+\sin 3\theta)$, then $f(\theta)$ is

(1) ≥ 0 only when $\theta\ge 0$

(2) ≤ 0 for all real θ

(3) ≥ 0 for all real θ

(4) ≤ 0 only when $\theta\le 0$

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

(1) $e^x<1+x$ (2) $\log_e(1+x)<x$

(3) $\sin x>x$ (4) $\log_e x>x$

19. The domain of definition of the cuntion $y(x)$ given by $2^x+2^y=2$, is

(1) (0, 1] (2) [0, 1]

(3) $(-\infty,0]$ (4) $(-\infty,1)$

20. The domain of definition of the function an interval where it is supposed to be increasing. Which of the follwoing pairs is incorrectly matched

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

21. A real valued function $f(x)$ satifies the functional equation $f(x-y)=f(x)f(a-x)f(a+y)$ where a is a given constant and $f(0)=1, f(2a-x)$ is equal to :

(1) $f(-x)$ (2) $f(a)+f(a-x)$

(3) $f(x)$ (4) $-f(x)$

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

(1) $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$ (2) $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$

(3) $\left[0,\frac{\pi}{2}\right)$ (4) $\left(0,\frac{\pi}{2}\right)$

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

(1) $[2,3)$ (2) $[2,3]$

(3) $[1,2]$ (4) $[1,2)$

24. The graph of the function $y=f(x)$ is symmetrical about the line $x = 2$, then :

(1) $f(x+2)=f(x-2)$

(2) $f(2+x)=f(2-x)$

(3) $f(x)=f(-x)$

(4) $f(x)=-f(-x)$

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

(1) $[0,3]$ (2) $[-1,1]$

(3) $[0,1]$ (4) $[-1,3]$

26. The range of the function $f(x)=^{7-x}p_{x-3}$ is :

(1) $\{1,2,3\}$ (2) $\{1,2,3,4,5,6\}$

(3) $\{1,2,3,4\}$ (4) $\{1,2,3,4,5\}$

27. If $f:R\to R$ satisfies $f(x+y)=f(x)+f(y)$, for all $x, y\in R$ *and* $f(1)=7$, then $\sum_{r=1}^{n}f(r)$ is :

(1) $\frac{7n}{2}$ (2) $\frac{7(n+1)}{2}$

(3) $7n(n+1)$ (4) $\frac{7n(n+1)}{2}$

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

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

(3) $(1,2)\cup(2,\infty)$

(4) $(-1,0)\cup(1,2)\cup(2,\infty)$

29. The function $f(x)=\log\left(x+\sqrt{x^2+1}\right)$ is :

(1) an even function
(2) an odd function
(3) a periodic function
(4) neither an even nor odd function

30. A function f from the set of natural numbers to integers defined by

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

(1) one-one but not onto
(2) onto but not one-one
(3) ono-one and onto both
(4) neither an even nor odd function

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

(1) $[1,9]$ (2) $[-1,9]$

(3) $[-9,1]$ (4) $[-9,-1]$

32. If $y=f(x)=\frac{x+2}{x+1}$, then

(1) $x=f(y)$ (2) $f(1)=3$

(3) y increases with x for $x<1$

(4) f *is* a rational function of x

33. If $f(x)=\cos(\log x)$,

then $f(x)f(y)-\frac{1}{2}\left[f\left(\frac{x}{y}\right)+f(xy)\right]$ has the value :

(1) – 1 (2) $\frac{1}{2}$

(3) – 2 (4) none of these

34. If $f(x)=x^2+1$, then $f^{-1}(17)$ *and* $f^{-1}(13)$ will be :

(1) 4, 1 (2) 4, 0

(3) 3, 2 (4) none of these

35. Inverse of the function $y=2x-3$ is :

(1) $\frac{x+3}{2}$ (2) $\frac{x-3}{2}$

(3) $\frac{1}{2x-3}$ (4) none of these

36. If x *is* real then value of the expression $\frac{x^2+14x+9}{x^2+2x+3}$ lies between ;

(1) 5 and 4 (2) 5 and – 4

(2) – 5 and 4 (3) none of these

37. Let $f:R\to R$ be a function defined by $f(x)=\frac{x-m}{x-n}$, where $m\neq n$. then :

(1) f is one-one onto

(2) f is one-one into

(3) f is many-one onto

(4) f is many-one into

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

(1) 144 (2) 12

(3) 24 (4) 64

39. If $f(x)=a\cos(bx+c)+d$, then range of $f(x)$ is :

(1) $[d+a,\ d+2a]$ (2) $[a-d,\ a+d]$

(3) $[d+a,\ a-d]$ (4) $[d-a,\ d+a]$

40. Domain of the function $f(x)=\left[\log_{10}\left(\frac{5x-x^2}{4}\right)\right]^{1/2}$ is :

(1) $-\infty<x<\infty$ (2) $1\le x\le 4$

(2) $4\le x\le 16$ (4) $-1\le x\le 1$

41. If $f(x)=ax+b$ and $g(x)=cx+d$, then $f(g(x))=g(f(x))$ is equal to :

(1) $f(a)=g(c)$ (2) $f(b)=g(b)$

(3) $f(d)=g(b)$ (4) $f(c)=g(a)$

42. If $f(x)=3x+10,\ g(x)=x^2-1,$ then $(fog)^{-1}$ is equal to :

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

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

43. If $f(x)=\cos^2 x+\sec^2 x$, then :

(1) $f(x)<1$ (2) $f(x)=1$

(3) $2>f(x)>1$ (4) $f(x)\ge 2$

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

(1) $\sin x+x^2$ (2) $(\sin x)^2$

45. Which of the statements given bellow is different bellow is defferent from others ?

(1) $f : A \to B$ (2) $f : x \to f(x)$

(3) f *is* a mapping of A into B

(4) none of these

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

(1) $[1,9]$ (2) $[-1,9]$

(3) $[-9,1]$ (4) $[-9,-1]$

47. The domain of definition of the function

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

(1) $[1,4]$ (2) $[1,0]$

(3) $[0,5]$ (4) $[5,0]$

48. Let $f : (2,3) \to (0,1)$ be defined by $f(x) = x - [x]$, then $f^{-1}(x)$ equals :

(1) $x-2$ (2) $x+1$

(3) $x-1$ (4) $x+2$

49. $f(x) = ax^2 + bx + c$ and $g(x) = px^2 + qx$ with $g(1) = f(1)$, $g(2) - f(2) = 1$, $g(3) - f(3) = 4$, then $g(4) - f(4)$ is :

(1) 0 (2) 5

(3) 6 (4) none of these

50. Range of the function $f(x) = \frac{x^2}{x^2+1}$ is :

(1) $(-1,0)$ (2) $(-1,1)$

(3) $[0,1)$ (4) $(1,1)$

51. The period of the function $\sin\left(\frac{2x}{3}\right) + \sin\left(\frac{3x}{2}\right)$ is :

(1) 2π (2) 10π

(3) 6π (4) 12π

52. $f(x) = x + \sqrt{x^2}$ is a function from R to R, then $f(x)$ is :

(1) injective (2) surjective

(3) bijective (4) none of these

53. Let $f(x) = \sin(\log x)$, then the value of $f(xy) + f\left(\frac{x}{y}\right) - 2f(x)\cos(\log y)$ is :

(1) – 1 (2) 0

(3) 2 (4) 1

54. The function $f(x) = \frac{1 - \sin x + \cos x}{1 + \sin x + \cos x}$ is not defined at $x = \pi$, is :

(1) $-\frac{1}{2}$ (2) $\frac{1}{2}$

(3) – 1 (4) 1

55. The function defined by

$$f(x) = \begin{cases} \left(x^2 + e^{\frac{1}{2-x}}\right)^{-1}, & x \neq 2 \\ k, & x = 2 \end{cases}$$ is

continuous from right at the point $x = 2$, then k is equal to :

(1) 0 (2) 1/4

(3) –1/4 (4) none of these

56. If $f(x) = \cot^{-1}\left(\frac{3x - x^3}{1 - 3x^2}\right)$ and

$g(x) = \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, then

$\lim_{x \to a} \frac{f(x) - f(a)}{g(x) - g(a)}, 0 < a < \frac{1}{2}$ is :

(1) $\frac{3}{2(1+a^2)}$ (2) $\frac{3}{2(1+x^2)}$

(3) $\frac{3}{2}$ (4) $-\frac{3}{2}$

57. Let $A=R-\{3\}, B=R-\{1\}$, let $f: A \to B$ be defined by $f(x)=\frac{x-2}{x-3}$, then :

(1) f is bijective
(2) f is one-one but not onto
(3) f is onto but not one-one
(4) none of these

58. 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:

(1) $\{2,3\}$ (2) $\{2,3,4\}$
(3) $\{1,2,3,4\}$ (4) $\{1,2,3,4,5\}$

59. If $y=f(x)=\frac{ax+b}{cx-a}$, then x is equal to :

(1) $1/f(x)$ (2) $1/f(y)$
(3) $yf(x)$ (4) $f(y)$

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

(1) xy (2) $x^2-a^2y^2$
(3) $\frac{x^2-y^2}{4}$ (4) $\frac{x^2-y^2}{a^2}$

61. The domain of the function $y=\sqrt{\frac{1}{x}-1}$ is :

(1) $x \le 1$ (2) $0 \le x \le 1$
(3) $0 \le x < 1$ (4) $0 < x \le 1$

62. The period of $f(x)=x-[x]$, if it is periodic, is :

(1) $f(x)$ is not periodic (2) $\frac{1}{2}$
(3) 1 (4) 2

63. Let $f: N \to N$ defined by $f(x)=x^2+x+1, x \in N$, then f is

(1) one-one onto (2) many- one onto
(3) one-one but not onto
(4) non of these

64. Let $f(x)=ax+b$ and $g(x)=cx+d, a \neq 0, c=0$. assume a =1, b = 2. If $(fog)(x)=(gof)(x)$ for all x, what can you say about c and d ?

(1) c and d both are arbitrary
(2) c = 1, d is arbitrary
(3) c is arbitrary, d = 1
(4) c =1, d =1

65. Which of the following function is inverse function ?

(1) $f(x)=\frac{1}{x-1}$ (2) $f(x)=x^2$, for all x
(3) $f(x)=x^2, x \ge 0$ (4) $f(x)=x^2, x \le 0$

66. The largest possible set of real numbers which can be the domain of $f(x)=\sqrt{1-\frac{1}{x}}$, is :

(1) $(0,1) \cup (0,\infty)$ (2) $(-1,0) \cup (1,\infty)$
(3) $(-\infty,-1) \cup (0,\infty)$ (4) $(-\infty,0) \cup (1,\infty)$

67. If $f(x)$ is periodic function with period T, then the function $f(ax+b)$ where $a > 0$, is periodic with period :

(1) T/ b (2) aT
(3) bT (4) T/a

68. Domain of $f(x)=\log|\log x|$ is :

(1) $(0,\infty)$ (2) $(1,\infty)$
(3) $(0,1) \cup (1,\infty)$ (4) $(-\infty,1)$

69. The domain of the function

$f(x)=\frac{1}{\log_{10}(1-x)}+\sqrt{x+2}$ is :

(1) $]-3,-2.5[\cup]-2.5,-2[$
(2) $[-2,0[\cup]0,1[$
(3) $]0,1[$ (4) none of these

70. If $f:R\to R$ is defined by $f(x)=[2x]-2[x]$ for $x\in R$, where $[x]$ is the greatest integer not exceeding x, then the range of f is:

(1) $\{x\in R:0\le x\le 1\}$ (2) $\{0,1\}$

(3) $\{x\in R:x>0\}$ (4) $\{x\in R:x\le 0\}$

71. If $f:R\to R$ is defined by

$$f(x)=\begin{cases}x+4 & for \quad x<-4\\ 3x+2 & for \quad -4\le x<4\\ x-4 & for \quad x\ge 4\end{cases}$$ then the corect matching of List from List II is

List - I

(1) $f(-5)+f(-4)$

(2) $f(|f(-8)|)$

(3) $f(f(-7)+f(3))$

(4) $f(f(f(f(0))))+1$

List - II

(i) 14

(ii) 4

(iii) – 11

(iv) –1

(v) 1

(vi) 0

	(1)	(2)	(3)	(4)
(1)	(iii)	(vi)	(ii)	(v)
(2)	(iii)	(iv)	(ii)	(v)
(3)	(iv)	(iii)	(ii)	(i)
(4)	(iii)	(vi)	(v)	(ii)

72. If $f:R\to R$ is defined by $f(x)=x-[x]-\frac{1}{2}$ for $x\in R$, where $[x]$ is the greatest integer not exceeding x, then $\left\{x\in R:f(x)=\frac{1}{2}\right\}$ is equal to

(1) Z, the set of all integers

(2) N, the set of all natural numbers

(3) ϕ, the empty set

(4) R

73. The function $f:C\to C$ defined by $f(x)=\frac{ax+b}{cx+d}$ for $x\in C$ where $bd\ne 0$ reduces to a constant function, if :

(1) $a = c$ (2) $b = d$

(3) $ad = bc$ (4) $ab = cd$

74. If N denotes the set of all positive integers and if $f:N\to N$ is defined by $f(n)=$ the sum of positive divisors of n then, $f(2^k,3)$, where k is a positive integers, is

(1) $2^{k+1}-1$ (2) $2(2^{k+1}-1)$

(3) $3(2^{-k+1}-1)$ (4) $4(2^{k+1}-1)$

75. If $f:R\to R$ and $g:R\to R$ are given by $f(x)=|x|$ and $g(x)=[x]$ for each $x\in R$, then $\{x\in E:g(f(x))\le f(g(x))\}$ is equal to

(1) $I\cup(-\infty,0)$ (2) $(-\infty,0)$

(3) I (4) R

76. Suppose $f:[2,2]\to R$ is defined by

$$f(x)=\begin{cases}-1, & for \quad -2\le x\le 0\\ x-1, & for \quad 0\le x\le 2\end{cases}$$, then

$\{x\in\{-2,2\}:x\le 0$ and $f(|x|)=x\}$ is equal to

(1) { –1 } (2) { 0 }

(3) { –1/2 } (4) ϕ

77. If $f:R\to R$ and $g:R\to R$ are defined by $f(x)=2x+3$ and $g(x)=x^2+7$, then the values of x such $g(f(x))=8$ are

(1) 1, 2 (2) –1, 2

(3) –1, –2 (4) 1, –2

78. If $e^{f(x)}=\frac{10+x}{10-x}, x\in(-10,10)$ and $f(x)=kf\left(\frac{200x}{100+x^2}\right)$, then k is equal to

(1) 0.5 (2) 0.6

(3) 0.7 (4) 0.8

79. If $f(x)=\frac{1}{\sqrt{x+2\sqrt{2x-4}}}+\frac{1}{\sqrt{x-2\sqrt{2x-4}}}$, for $x > 2$, then $f(11)$ is equal to

(1) $\frac{7}{6}$ (2) $\frac{5}{6}$

(3) $\frac{6}{7}$ (4) $\frac{5}{7}$

80. The function $f:R\to R$ is defined by $f(x)=\cos^2 x+\sin^4 x$ for $x\in R$, then $f(R)$ is equal to

(1) $\left(\frac{3}{4},1\right]$ (2) $\left[\frac{3}{4},1\right)$

(3) $\left[\frac{3}{4},1\right]$ (4) $\left(\frac{3}{4},1\right)$

81. If $f(x)=\frac{\cos^2 x+\sin^4 x}{\sin^2 x+\cos^4 x}$ for $x\in R$, then $f(2002)$ equalt to

(1) 1 (2) 2

(3) 3 (4) 4

82. If $f:R\to R$ be defined by $f(x)=2x+3$ and $g(x)=x^2+7$, then the value of x for which $f(g(x))=25$ are

(1) ± 1 (2) ± 2

(3) ± 3 (4) ± 4

83. Let $f:R\to R$ be defined by $f(x)=2x+|x|$, then $f(2x)+f(-x)-f(x)$ is equal to

(1) $2x$ (2) $2|x|$

(3) $-2x$ (4) $-2|x|$

84. Let X and Y be subsets of R, the set of the real numbers. The function $F:X\to Y$ defined by $f(x)=x^2$ for $x\in X$ is one-one but not onto

(1) X = Y = R^+ (2) X = r, Y = R^+

(3) X = R^+, Y = R (4) X = Y = R

85. The range of the function $f(x)=\frac{x+2}{|x+2|}$ is

(1) { 0, 1 } (2) { –1, 1}

(3) R (4) R – { –2 }

86. The domain of the function $f(x)=\sin^{-1}\left[\log_2(x/2)\right]$ is

(1) [1, 4] (2) [– 4, 1]

(3) [–1, 4] (4) none of these

87. The range of $f(x)=\cos(x/3)$ is

(1) (–1/3, 1/3) (2) [–1, 1]

(3) { 1/3, –1/3} (4) (–3, 3)

88. The domain of the function $f(x)=\log\left(\sqrt{x-4}+\sqrt{6-x}\right)$ is

(1) $[4,\infty)$ (2) $(-\infty,6]$

(3) [4, 6] (4) none of these

89. The inverse of the function $\frac{10^x-10^{-x}}{10^x+10^{-x}}$ is

(1) $\frac{1}{2}\log_{10}\left(\frac{1+x}{1-x}\right)$ (2) $\frac{1}{2}\log_{10}\left(\frac{1-x}{1+x}\right)$

(3) $\frac{1}{4}\log_{10}\left(\frac{2x}{2-x}\right)$ (4) none of these

90. The domain of the function $f(x)=\sqrt{\log\frac{1}{|\sin x|}}$ is

(1) $R-\{2n\pi, n\in I\}$ (2) $R-\{n\pi, n\in I\}$

(3) $R-\{-\pi,\pi\}$ (4) $(-\infty,\infty)$

91. If $f:R\to R$, then $f(x)=|x|$ is

(1) one-one but not onto

(2) onto but not one-one

(3) one-one and onto

(4) none of these

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

(1) $\sqrt{2}$ (2) $-\sqrt{2}$
(3) 1 (4) 2

93. The domain of $\sin^{-1}(\log_3 x)$ is

(1) $[-1,1]$ (2) $[0,1]$
(3) $[0,\infty]$ (4) R
(5) $\left[\frac{1}{3},3\right]$

94. The function f satisfies the functional equation $3f(x)+2f\left(\frac{x+59}{x-1}\right)=10x+30$ for all real $x\neq 1$. The value of $f(7)$ is

(1) 8 (2) 4
(3) – 8 (4) 11
(5) 44

95. If $f:R\to R$ is defined by $f(x)=x^2-6x-14$, then $f^{-1}(2)$ equals to

(1) { 2, 8 } (2) {–2, 8}
(3) {– 2, –8 } (4) {2, – 8}
(5) $\{\phi\}$

96. Let $f:R\to R: f(x)=x^2$ and $g:R\to R: g(x)=x+5$, then *gof* is

(1) $(x+5)$ (2) $(x+5^2)$
(3) (x^2+5^2) (4) $(x+5)^2$
(5) (x^2+5)

97. The range of the function $\sin\left(\sin^{-1}x+\cos^{-1}x\right)$, $|x|\leq 1$ is

(1) $[-1,1]$ (2) $[1,-1]$
(3) { 0 } (4) $\{-1\}$
(5) { 1 }

98. If $f(x)=\cos(\log_e x)$, then

$f(x)f(y)-\frac{1}{2}\left[f\left(\frac{y}{x}\right)+f(xy)\right]$ has the value

(1) 1 (2) 1/2
(3) – 2 (4) 0
(5) – 1

99. Domain of the function $f(x)=\sin^{-1}(\log_2 x)$ in the set of real numbers, is

(1) $\{x:1\leq x\leq 2\}$ (2) $\{x:1\leq x\leq 3\}$
(3) $\{x:-1\leq x\leq 2\}$ (4) $\left\{x:\frac{1}{2}\leq x\leq 2\right\}$
(5) $\left\{x:-\frac{1}{2}\leq x\leq 2\right\}$

100. If $f(x)=\frac{1-x}{1+x}$, $(x\neq -1)$, then $f^{-1}(x)$ equals to

(1) $f(x)$ (2) $1/f(x)$
(3) $-f(x)$ (4) $-1/f(x)$
(5) not defined

101. Let the function f be defined by $f(x)=\frac{2x+1}{1-3x}$, then $f^{-1}(x)$ is :

(1) $\frac{x-1}{3x+2}$ (2) $\frac{3x+2}{x-1}$
(3) $\frac{x+1}{3x-2}$ (4) $\frac{2x+1}{1-3x}$

102. If $f(x)=\log\frac{1+x}{1-x}$, then $f(x)$ is :

(1) even function
(2) $f(x_1)f(x_2)=f(x_1+x_2)$
(3) $\frac{f(x_1)}{f(x_2)}=f(x_1-x_2)$
(4) odd functin

103. which one of the following is a bijective function on the set of real number ?

(1) $2x-5$ (2) $|x|$
(3) x^2 (4) x^2+1

104. If $f(x)=\frac{2x+1}{3x-2}$, then $(fof)(2)$ is equal to :

(1) 1 (2) 3
(3) 4 (4) 2

105. If $f(x)$ is a function such that $f^{-1}(x)+f(x)=0$ and $g(x)=[f(x)]^2+[f'(x)]^2$ and $g(3)=3$ then $g(8)$ is equal to :

(1) 5 (2) 0
(3) 3 (4) 8

106. If $f(x)$ and $g(x)$ are two functions with $g(x)=x-\frac{1}{x}$ and $fog(x)=x^3-\frac{1}{x^3}$, then $f'(x)$ is :

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

(3) $1+\frac{1}{x^2}$ (4) $3x^2+\frac{3}{x^4}$

107. The function $f:x\to y$ defined by $f(x)=\sin x$ is one-one but not onto, if X and Y are respectively equal to :

(1) R and R (2) $[0,\pi]$ and $[0,1]$

(3) $\left[0,\frac{\pi}{2}\right]$ and $[-1,1]$

(4) $\left[-\frac{\pi}{2},\frac{\pi}{2}\right]$ and $[-1,1]$

108. If R denotes the set of all real numbers, then the function $f:R\to R$ defined $f(x)=|x|$ is :

(1) one-one only (2) onto only
(3) both one-one and onto
(4) neither one-one nor onto

109. The function $f:R\to R$ defined by $f(x)=e^x$ is :

(1) onto (2) many-one
(3) one-one and into (4) many-one and onto

110. If the function $f(x)$ is defined by $f(x)=a+bx$ and $f^r=fff...$ (repeated r times), then $f^r(x)$ is equal to :

(1) $a+b^rx$ (2) $ar+b^rx$

(3) $ar+bx^r$ (4) $a\left(\frac{b^r-1}{b-1}\right)+b^rx$

111. $f(x)=\frac{1-x}{1+x}(x\neq -1)$, then $f^{-1}(x)$ equals to :

(1) $f(x)$ (2) $\frac{1}{f(x)}$

(3) $-f(x)$ (4) $-\frac{1}{f(x)}$

112. If $2f(x+1)+f\left(\frac{1}{x+1}\right)=2x$ and $x\neq -1$, then $f(2)$ is equal to :

(1) – 1 (2) 2
(3) 5/3 (4) 5/2

113. If $f(x)=\frac{2x-2}{x+5},(x\neq 5)$, then $f^{-1}(x)$ is equal to :

(1) $\frac{x+5}{2x-1},x\neq\frac{1}{2}$ (2) $\frac{5x+1}{2-x},x\neq 2$

(3) $\frac{x-5}{2x-1},x\neq-\frac{1}{2}$ (4) $\frac{5x-1}{2-x},x\neq 2$

114. If $f(x)=\frac{x}{x-1}$, then $\underbrace{(f0\ f0....0f)}_{19times}(x)$ is equal to :

(1) $\frac{x}{(x-1)}$ (2) $\left(\frac{x}{x-1}\right)^{19}$

(3) $\frac{19x}{(x-1)}$ (4) x

115. The domain of the function $f(x)\exp\left(\sqrt{5x-3-2x^2}\right)$ is

(1) $[3/2,\infty)$ (2) $[1,3/2]$

(3) $(-\infty,1]$ (4) $(1,3/2)$

116. If 'n' is an integer, then domain of the function $\sqrt{\sin 2x}$ is :

(1) $\left[n\pi-\frac{\pi}{2},n\pi\right]$ (2) $\left[n\pi,n\pi+\frac{\pi}{2}\right]$

(3) $\left[(2n-1)\pi,2n\pi\right]$ (4) $\left[2n\pi,(2n+1)\pi\right]$

117. The domain of the function $\sqrt{\log\left(x^2-6x+5\right)}$ is :

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

(2) $\left(-\infty,3-\sqrt{3}\right)\cup\left(3+\sqrt{3},\infty\right)$

(3) $(-\infty,1]\cup[5,\infty)$

(4) $[0,\infty)$

118. Suppose that $g(x)=1+\sqrt{x}$ and $f\left(g(x)\right)=3+2\sqrt{x+x}$, then $f(x)$ is :

(1) $1+2x^2$ (2) $2+x^2$

(3) $1+x$ (4) $2+x$