1. The value of x which satisfies the equation $\log_2\left(x^2-3\right)-\log_2(6x-10)+1=0$

2. Solve $\log_{10}(2^x+1)+x=\log_{10}(6)+x\log_{10}(5)$.

(1) 4
(2) 5
(3) 2
(4) 1

3. $\log_{\frac{1}{3}}\left(x^2+2x\right)>0$, if x belongs to the set

(1) $\left(-1-\sqrt{2},-1+\sqrt{2}\right)$
(2) $(-\infty,\ -2)\cup(0,\ \infty)$
(3) $\left(-1-\sqrt{2},-2\right)\cup\left(0,\sqrt{2}-1\right)$
(4) None of these

4. If $\log_{175}(5x)=\log_{343}7x$, then the value of $\log_{42}\left(x^4-2x^2+7\right)$ is equal to

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

5. Sum of all possible values of x which satisfy the equation $\log_3(x-3)=\log_9(\mathrm{x}-1)$ is:

(1) 2
(2) 5
(3) 7
(4) 10

6. $\begin{vmatrix} 5^{\sqrt{\log_5 3}} & 5^{\sqrt{\log_5 3}} & 5^{\sqrt{\log_5 3}} \\ 3^{-\log_{1/3}(4)} & (0.1)^{\log_{0.01}(4)} & 7^{\log_7(3)} \\ 7 & 3 & 5 \end{vmatrix}$ is equal to

(1) 0
(2) $5^{\sqrt{\log_5 3}}$
(3) $2\cdot 5^{\sqrt{\log_5 3}}$
(4) None of these

7. The set of all solutions of the equation $\log_3 x\log_4 x\log_5 x=\log_3 x\log_4 x+\log_4 x\log_5 x+\log_5 x\log_3 x$ is

(1) $\{1\}$
(2) $\{1,60\}$
(3) $\{1,5,10,60\}$
(4) $\{1,4,8,60\}$

8. If $n>1$, the value of $\frac{1}{\log_2 n}+\frac{1}{\log_3 n}+\ldots+\frac{1}{\log_{53} n}$ is

(1) $\frac{1}{\log_{53!} n}$
(2) 1
(3) $\frac{1}{\log_{n!} 53}$
(4) $\frac{1}{53}$

9. The solution of the equation $4^{\log_2\log x}=\log x-(\log x)^2+1$ is

(1) $x=1$
(2) $x=4$
(3) $x=e$
(4) $x=e^2$

10. Suppose $x,\ y,\ z>0$ and distinct and $\ln x+\ln y+\ln z=0$, if the value of $x^{\frac{1}{\ln y}+\frac{1}{\ln z}}\cdot y^{\frac{1}{\ln z}+\frac{1}{\ln x}}\cdot z^{\frac{1}{\ln x}+\frac{1}{\ln y}}$ is e^{-k}, then $k=$

11. The solution set of $\log_{|\sin x|}\left(x^2-8x+23\right)>\frac{3}{\log_2|\sin x|}$ contains

(1) $x\in(3,\pi)\cup\left(\pi,\frac{3\pi}{2}\right)\cup\left(\frac{3\pi}{2},5\right)$
(2) $x\in(3,\pi)\cup(\pi,5)$
(3) $x\in\left(3,\frac{5\pi}{2}\right)$
(4) $x\in(2,5\pi/2)$

12. The set of all x satisfying the equation $x^{\log_3 x^2+(\log_3 x)^2-10}=1/x^2$ is

(1) $\{1,9\}$
(2) $\{1,9,1/81\}$
(3) $\{1,4,1/81\}$
(4) $\{9,1/81\}$

13. Consider the value of x which satisfies the following relation:

$\frac{6}{5}a^{\log_a x\cdot\log_{10} a\cdot\log_a 5}=3^{\log_{10}\frac{x}{10}}+9^{\log_{100} x+\log_4 2}$

This value of x lies between:

(1) 10 and 20
(2) 30 and 40
(3) 75 and 85
(4) 95 and 105

14. Solution set of the inequality
$\log_x\left(2x^2+x-1\right)>\log_x(2)-1$ is

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

15. Consider the equation $\log_{\sqrt{2}\sin x}\left(1+\cos x\right)=2, x\in\left[-\frac{\pi}{2},\frac{3\pi}{2}\right]$ If the sum of the roots is $\frac{p\pi}{q}$, where $GCD(p,\ q)=1$, then evaluate p^2+q^2

16. Solve the inequality
$\frac{(x-2)^{10000}(x+1)^{253}\left(x-\frac{1}{2}\right)^{971}(x+8)^4}{x^{500}(x-3)^{75}(x+2)^{93}}\geq 0$

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

17. Let $f(x)=\frac{(x-3)(x+2)(x+6)}{(x+1)(x-5)}$ Find where $f(x)$ is negative.

(1) $(-\infty,-6)\cup(-2,-1)\cup(3,5)$
(2) $(-\infty,-2)\cup(-1,3)\cup(5,\infty)$
(3) $(-\infty,-6]\cup(3,\infty)$
(4) $(-\infty,-2)\cup(-1,5)$

18. Solve the equation $\left|\frac{x^2-8x+12}{x^2-10x+21}\right|=-\frac{x^2-8x+12}{x^2-10x+21}$

(1) $[2,3)\cup[6,7]$
(2) $[2,3]\cup[6,7)$
(3) $[2,3)\cup[4,8)$
(4) $[2,3)\cup[6,7)$

19. Solve the inequality $(x+3)(3x-2)^5(7-x)^3(5x+8)^2\geq 0$

(1) $(-\infty,-3)\cup\left[\frac{2}{3},7\right)\cup\left(\frac{-8}{5}\right\}$
(2) $(-\infty,-3]\cup\left[\frac{2}{3},7\right]\cup\left\{-\frac{8}{5}\right\}$
(3) $\left(-\infty,\frac{2}{3}\right]\cup[7,\infty)$
(4) None of these

20. Find the number of integral values of x satisfying the inequation: $\frac{x}{x+2}\leq\frac{1}{|x|}$.

21. Solve the inequation $\sqrt{(-x^2+4x-3)}>6-2x$

(1) $\left(\frac{12}{7},4\right)$
(2) $\left(\frac{13}{5},4\right)$
(3) $\left(\frac{13}{5},3\right)$
(4) $\left(\frac{12}{7},3\right)$

22. Let [a] denotes the larger integer not exceeding the real number a. If x and y satisfy the equations $y=2[x]+3$ and $y=3[x-2]$ simulaneously, determine $[x+y]$

23. If $\{x\}$ and $[x]$ represent fractional and integral part of x respectively, find the value of $[x]+\sum_{r=1}^{2000}\frac{\{x+r\}}{2000}$

(1) x
(2) $x+\{x\}$
(3) $x+[x]$
(4) $2x+[x]$

24. Solve the equation $|x-|4-x||-2x=4$

(1) Two solutions
(2) Three solutions
(3) One solution
(4) No solution

25. The number of solution(s) the equation $|x-1|+|x-2|+|x-3|+|x-4|=3$ is

(1) 2
(2) 1
(3) 0
(4) 4

26. Find the set of all x for which $\frac{2x}{(2x^2+5x+2)}>\frac{1}{(x+1)}$

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

27. Number of integral values of x satisfying the inequation $\frac{\left(x^2-2x+8\right)\left(e^x+2\right)(x-3)(x-8)}{\left(\log_2\left(x^2+3\right)\right)(x-5)^2} \leq 0$ are

28. Solution set of equation $\left|1-\log_{\frac{1}{6}} x\right|+\left|\log_2 x\right|+2=\left|3-\log_{\frac{1}{6}} x+\log_{\frac{1}{2}} x\right|$ is $\left[\frac{a}{b}, a\right], a, b \in N$, then the value of $\frac{(a+b)}{2}$ is

(1) 5
(2) 6
(3) 7
(4) 8

29. Solve the inequation $\left|1-\frac{|x|}{1+|x|}\right| \geq \frac{1}{2}$.

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

30. Find the number of solution of the equation $[2x]-[x+1]=2x$ where $[\cdot]$ represent the greatest integer function.

(1) 2
(2) 3
(3) 1
(4) More than 3