HOMEWORK

1. The domain of the function $f(x) = \frac{\sqrt{-\log_{0.3}(x-1)}}{\sqrt{x^2+2x+8}}$ is

(A) $(1,4)$ (B) $(-2,4)$ (C) $(2,4)$ (D) $[2,\infty)$

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

(A) $0 < x < 1$ (B) $0 < x \leq 1$ (C) $x \geq 1$ (D) null set

3. If $q^2 - 4pr = 0, p > 0$, then the domain of the function,

$f(x) = \log(px^3 + (p+q)x^2 + (q+r)x + r)$ is

(A) $R - \left\{-\frac{q}{2p}\right\}$ (B) $R - \left[(-\infty,-1] \cup \left\{-\frac{q}{2p}\right\}\right]$

(C) $R - \left[(-\infty,-1] \cap \left\{-\frac{q}{2p}\right\}\right]$ (D) none of these

4. The domain of the function $\sqrt{\log_{1/3}\log_4([x]^2-5)}$ is (where [x] denotes greatest integer function)

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

(C) $R - [-2,3)$ (D) $R - [-3,3]$

5. If $f(x) = 2\sin^2\theta + 4\cos(x+\theta)\sin x \cdot \sin\theta + \cos(2x+2\theta)$ then value of $f^2(x) + f^2\left(\frac{\pi}{4}-x\right)$ is

(A) 0 (B) 1 (C) -1 (D) x^2

6. Let $P(x,y)$ be a moving point in the $x-y$ plane such that $[x].[y] = 2$, where [.] denotes the greatest integer function, then area of the region containing the points $P(x,y)$ is equal to :

(A) 1 sq. units

(B) 2 sq. units

(C) 4 sq. units

(D) None of these

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

(A) 12 (B) 14 (C) 16 (D) 15

8. The sum $\left[\frac{1}{2}\right] + \left[\frac{1}{2}+\frac{1}{2000}\right] + \left[\frac{1}{2}+\frac{2}{2000}\right] + \left[\frac{1}{2}+\frac{3}{2000}\right] + \cdots + \left[\frac{1}{2}+\frac{1999}{2000}\right]$ is equal to (where $[*]$ denotes the greatest integer function)

(A) 1000 (B) 999 (C) 1001 (D) None of these

9. Total number of solutions of the equation $x^2 - 4 - [x] = 0$ are (where [.] denotes the greatest integer function) :

(A) 1 (B) 2 (C) 3 (D) 4

10. $y = 2[x] + 3 \& y = 3[x - 2] + 5$ then $[x + y] = ?$

(A) 0 (B) 15 (C) 30 (D) 45

11. How many doots the following equation posses $3^{|x|}(2 - |x|) = 1$.

(A) 1 (B) 2 (C) 3 (D) 4

12. If $f(x) = \min\{|x - 1|, |x|, |x + 1|\}$, then :

(A) f is odd (B) f is even

(C) f is periodic (D) None of these

13. Let $g(x) = 1 + x - [x]$ and $f(x) = \begin{cases} -1 & \text{if } x < 0 \\ 0 & \text{if } x = 0 \\ 1 & \text{if } x > 0 \end{cases}$, then $\forall x$, fog(x) equals (where $[*]$ represents greatest integer function).

(A) x (B) 1 (C) f(x) (D) g(x)

14. Domain of the function

$f(x) = \log_e \left\{\log_{|\sin x|}(x^2 - 8x + 23) - \frac{3}{\log_2 |\sin x|}\right\}$ is given by :

(A) (3,5) (B) $(3, \pi) \cup (\pi, 5)$

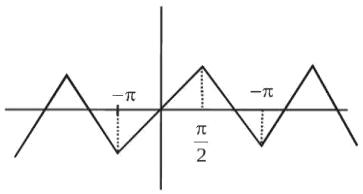
(C) $(3, \pi) \cup (3\pi/2, 5)$ (D) None of these

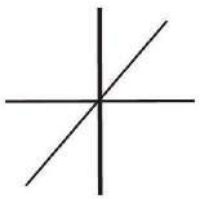
15. Which of the following has range above $y = 2$

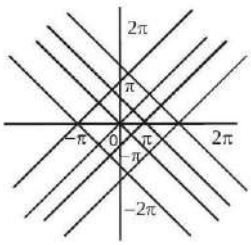
(A) $f(x) = \text{Sgn}(1 - |x|)$ (B) $f(x) = \text{Sgn}([x^2 - x])$

(C) $f(x) = \text{Min}(|x|, x^2, 2)$ (D) $f(x) = \text{Max}\{|\tan x|, \cos |x|\} x t[-\pi, \pi]$

16. $\sin y = \sin x$ has graph

(A) 

(B) 

(C) 

(D) Not

17. Find the domain of each of the following functions

(i) $f(x) = \frac{x^3-5x+3}{x^2-1}$ **(ii)** $f(x) = \frac{1}{\sqrt{x+|x|}}$

(iii) $f(x) = e^{x+\sin x}$ **(iv)** $f(x) = \frac{1}{\log_{10}(1-x)} + \sqrt{x+2}$

(v) $\log_x \log_2 \left(\frac{1}{x-1/2}\right)$ **(vi)** $f(x) = \sqrt{3-2^x-2^{1-x}}$

(vii) $f(x) = \sqrt{1-\sqrt{1-x^2}}$ **(viii)** $f(x) = (x^2+x+1)^{-3/2}$

(ix) $f(x) = \sqrt{\frac{x-2}{x+2}} + \sqrt{\frac{1-x}{1+x}}$ **(x)** $f(x) = \sqrt{\tan x - \tan^2 x}$

(xi) $f(x) = \frac{1}{\sqrt{1-\cos x}}$ **(xii)** $f(x) = \sqrt{\log_{1/4}\left(\frac{5x-x^2}{4}\right)}$

(xiii) $f(x) = \log_{10}\left(1-\log_{10}(x^2-5x+16)\right)$

ANSWER KEY

1.	D	**2.**	D	**3.**	B	**4.**	A	**5.**	B	**6.**	C	**7.**	B
8.	A	**9.**	B	**10.**	B	**11.**	B	**12.**	B	**13.**	B	**14.**	D
15.	D	**16.**	C										

17. **(i)** $R - \{-1,1\}$ **(ii)** $(0,\infty)$ **(iii)** R

(iv) $[-2,0) \cup (0,1)$ **(v)** $\left(\frac{1}{2},1\right) \cup \left(1,\frac{3}{2}\right)$ **(vi)** $[0,1]$

(vii) $[-1,1]$ **(viii)** R **(ix)** ϕ

(x) $\cup_{n\in1}\left[n\pi, n\pi+\frac{\pi}{4}\right]$ **(xi)** $R - \{2n\pi\}, n \in I$ **(xii)** $(0,1] \cup [4,5)$

(xiii) $(2,3)$