1. ANS: C TOP: Compositions of Functions

2. ANS: D TOP: Defining Functions

3. ANS: B TOP: Graphing Logarithmic Functions

4. ANS: A TOP: Identifying the Equation of a Graph

5. ANS: D TOP: Defining Functions

6. ANS: C TOP: Defining Functions

7. ANS: D TOP: Compositions of Functions

8. ANS: B TOP: Domain and Range

9. ANS: B TOP: Defining Functions

10. ANS: B TOP: Defining Functions

11. ANS: A TOP: Domain and Range

12. ANS: D TOP: Defining Functions

13. ANS: C TOP: Domain and Range

14. ANS: A TOP: Domain and Range

15. ANS: A TOP: Compositions of Functions

16. ANS: B TOP: Domain and Range

17. ANS: D TOP: Functional Notation

18. ANS: C TOP: Defining Functions

19. ANS: D TOP: Compositions of Functions

20. ANS: B TOP: Inverse of Functions

21. ANS: D TOP: Set Theory

22. ANS: B TOP: Undefined Rationals

23. ANS: D

24. ANS: D

25. ANS: A

Q#1a

(i) $\frac{2}{x} < \frac{3}{x-2}$

$\frac{2}{x} - \frac{3}{x-2} < 0$

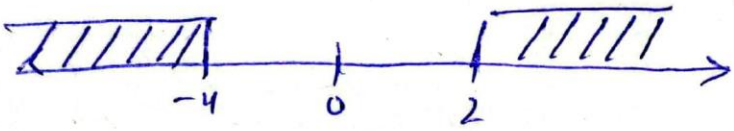
$\frac{2(x-2)-3x}{x(x-2)}$

$\frac{2x-4-3x}{x(x-2)} < 0$

$\frac{-x-4}{x(x-2)} < 0$

$-x-4=0, \quad x=0, \quad x-2=0$

$x=-4, \quad x=0, \quad x=2$



$(-\infty, -4) = +ve$
$(-4, 0) = -ve$ ✓
$(0, 2) = +ve$
$(2, \infty) = -ve$ ✓

Ans:
$(-4, 0) \cup (2, \infty)$

(ii)

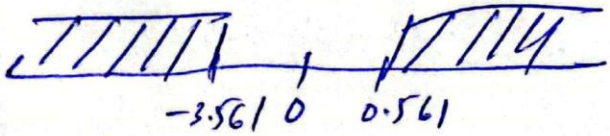
$x^3 + 3x^2 - 2x \geq 0$

$x(x^2 + 3x - 2) \geq 0$

$x=0, \quad x^2+3x-2=0$

$x=0,$ Use quadratic Formula

$x = -3.561, x = 0.561$



$(-\infty, -3.561] \rightarrow -ve$
$[-3.561, 0] \rightarrow +ve$
$[0, 0.561] \rightarrow -ve$
$[0.561, \infty) \rightarrow +ve$

Ans

$[-3.561, 0] \cup [0.561, \infty)$

Q#1 (b)

(i) $|2x-3| = 2|3x-5|$

$$\left|\frac{2x-3}{3x-5}\right| = 2$$

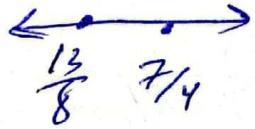
$$\frac{2x-3}{3x-5} = 2 \quad , \quad -\left(\frac{2x-3}{3x-5}\right) = 2$$

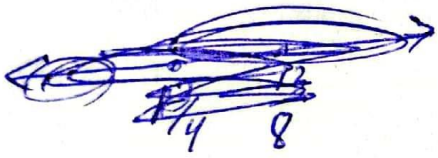
$2x-3 = 6x-10$, $\quad -2x+3 = 6x-10$

$2x-6x = -10+3$, $\quad -2x-6x = -10-3$

$-4x = -7$, $\quad -8x = -13$

$\boxed{x = \frac{7}{4}}$, $\boxed{x = \frac{13}{8}}$





(ii) $\frac{1}{|2x-3|} \leq 3$

$|2x-3| \geq \frac{1}{3}$

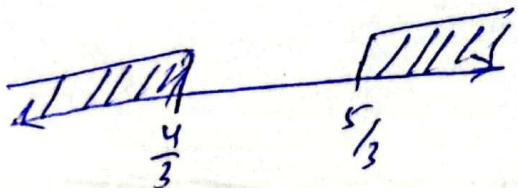
$2x-3 \geq \frac{1}{3}$, $\quad -(2x-3) \geq \frac{1}{3}$

$2x \geq \frac{1}{3}+3$, $\quad 2x-3 \leq -\frac{1}{3}$

$2x \geq \frac{10}{3}$, $\quad 2x \leq -\frac{1}{3}+3$

$x \geq \frac{5}{3}$ $\quad 2x \leq \frac{8}{3}$

$x \leq \frac{4}{3}$



Ans:- $(-\infty, \frac{4}{3}] \cup [\frac{5}{3}, \infty)$.

Q#2

(a) fog , $f(x) = \frac{x}{1+x^2}$, $g(x) = \frac{1}{x}$

$fog = f(g(x))$

$fog = \frac{\left(\frac{1}{x}\right)}{1+\left(\frac{1}{x}\right)^2}$

$fog = \frac{\frac{1}{x}}{1+\frac{1}{x^2}}$

$fog = \frac{1}{x} \div \frac{x^2+1}{x^2}$

$fog = \frac{1}{x} \times \frac{x^2}{x^2+1}$

$$\boxed{fog = \frac{x}{x^2+1}}$$

Domain of fog is the domain of $g(x)$ and satisfied fog.

domain of $g(x) = \frac{1}{x}$ is $(-\infty, 0) \cup (0, \infty)$

is satisfied fog so domain of fog is $(-\infty, 0) \cup (0, \infty)$

$gof = g(f)$

$gof = \frac{1}{\frac{x}{1+x^2}}$

$gof = \frac{1+x^2}{x}$

domain of $f(x)$ is $(-\infty, \infty)$

but domain of gof is $(-\infty, 0) \cup (0, \infty)$
b/c 0 is not satisfied the gof.

(b) $f(x) = \begin{cases} \frac{7}{2} - x, & x < 2 \\ \frac{3}{x}, & x \geq 2 \end{cases}$

For $y = \frac{7}{2} - x$, put $x = \frac{3}{2}, \frac{5}{2}, \frac{7}{2}, \frac{9}{2}, \ldots, y \geq \frac{3}{2}$

$x = \frac{7}{2} - y \Rightarrow f^{-1}(x) = \frac{7}{2} - x, \quad x > \frac{3}{2}$

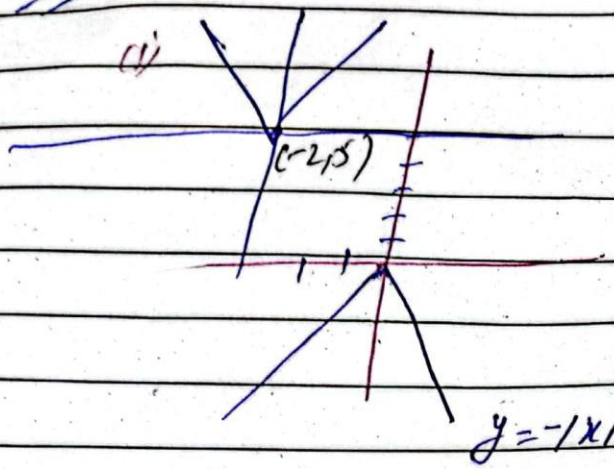
For $y = \frac{3}{x}, \quad x \geq 2, \quad y = \frac{3}{2}, 1, \frac{3}{4}, \frac{3}{5}, \ldots, y \leq \frac{3}{2}$

$x = \frac{3}{y} \Rightarrow f^{-1}(x) = \frac{3}{x}, \quad x \leq \frac{3}{2}$

$$f^{-1}(x) = \begin{cases} \frac{7}{2} - x, & x > \frac{3}{2} \\ \frac{3}{x}, & x \leq \frac{3}{2} \end{cases}$$ Ans

Q#3

(i)



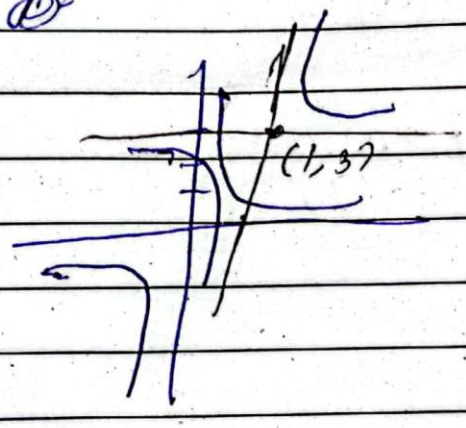
$y = -|x+2| + 5$

$y - 5 = -|x+2|$

$y - k = f(x-h)$

$(h, k) = (-2, 5)$

(ii)

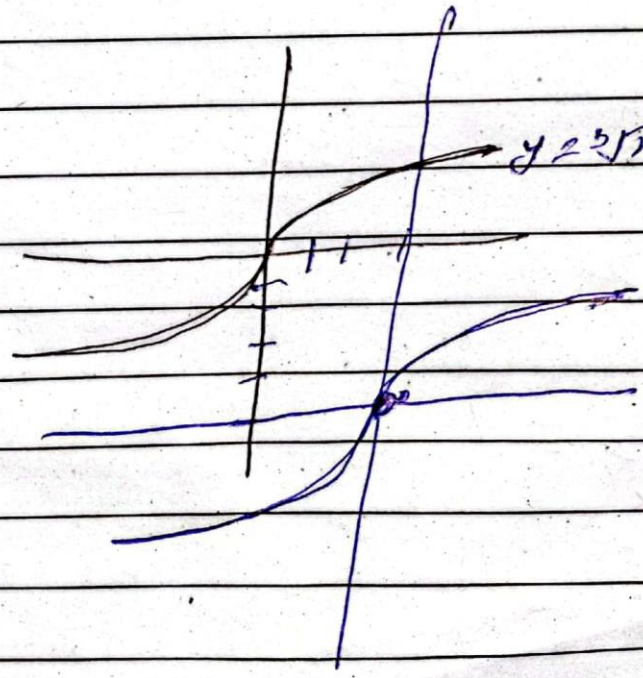


$y = \frac{1}{x-1} + 3$

$y - 3 = \frac{1}{x-1}$

$h = 1, \quad k = 3$

(iii) $y = \sqrt[3]{x-3} - 5$



$y + 5 = \sqrt[3]{x-3}$

$h = 3, \quad k = -5$

$y = \sqrt[3]{x-3} - 5$

Q#4 (i) $f(-1) = 1$

$\lim_{x \to -1} f(x) = ?$

L.H.L $= \lim_{x \to -1^-} f(x) = 0$

R.H.L $= \lim_{x \to -1^+} f(x) = 1$

$\lim_{x \to -1} f(x) =$ D.N.E

(ii) $\lim_{x \to 1} f(x) = ?$, $\boxed{f(1) = -2}$

L.H.L $= \lim_{x \to 1^-} f(x) = 1$

R.H.L $= \lim_{x \to 1^+} f(x) = 2$

$\lim_{x \to 1} f(x) =$ D.N.E

(iii) $\lim_{x \to 3} f(x) = 2$

L.H.L $= 1$, R.H.L $= 1$

$\lim_{x \to 3} f(x) = 1$

$\lim_{x \to 1^-} f(x) = \lim_{x \to 1^+} f(x)$

$\lim_{x \to 1^-} (b - x) = \lim_{x \to 1^+} a(x-2)^2$

$b - 1 = a$

$\boxed{b = a + 1} \rightarrow (1)$

(ii) put $a = -1$ in (1)

$\boxed{b = 0}$

(iii) put $a = 3$ in (1)

$b = 3 + 1$

$\boxed{b = 4}$ (Note put any value of a so, different Ans)

#6

$\lim_{t \to 10^+} (c^2 - 15c - 3t) = \lim_{t \to 10^-} 2t$

$c^2 - 15c - 30 = 20$

$c^2 - 15c - 30 - 20 = 0$

$c^2 - 15c - 50 = 0$

$c = \frac{15 + 5\sqrt{17}}{2}, \quad c = \frac{15 - 5\sqrt{17}}{2}$

(ii) b/c $f(x)$ is divide $t = 10$,

#7

(a) No value, (b) $x = \pm 9$ (c) $x = \pm 6$ (d) $x = -3$