Sec-10
Mid - 116
Quiz - 02

1.a. $f(t) = \frac{\sqrt{t-5}}{2t-14}$

For the square root $t-5 \geq 0 \Rightarrow t \geq 5$ —— (i) (1)

And for the rational function $f(t)$, we have to exclude those values of t that makes the function undefined i.e the denominator goes to zero.

$\therefore 2t-14=0 \Rightarrow 2t=14 \therefore t=7$. —— (ii) (1)

combining (i) and (ii)

$D = \{t \mid t \geq 5, t \neq 7\}$ or $D = [5,7) \cup (7,\infty)$.

b. Given, $f(x) = 4x^2 - x$

at $x=1$, $f(1) = 4-1 = 3$ (0.5)

at $x=2$, $f(2) = 4.2^2 - 1 = 16-2 = 14$ (0.5)

The eqn of secant line will be containing the points (1,3) and (2,14).

$\therefore y-3 = m(x-1)$ —— (i)

We know $m = \frac{f(2)-f(1)}{2-1} = \frac{14-3}{2-1} = 11$ (1)

From (i) →

$y-3 = 11(x-1)$

$\Rightarrow y = 11x - 11 + 3$

$\therefore \boxed{y = 11x - 8}$ (2)

2. a. Domain $= (-\infty, \infty)$
Range $= (-\infty, \infty)$ } (1)

b. Increasing intervals: $(-\infty, -2)$, $(-1, 1)$, $(2, \infty)$
Decreasing " : $(-2, -1)$, $(1, 2)$ } (2)

c. local maximum is at $x = -2$ and maxim value = 3
" " " at $x = 1$ and " " = 2 (1)

local minimum is at $x = -1$ and minimum value = 0
" " " at $x = 2$ " " " = -1 (1)

d. Dosenot have any absolute maximum or absolute minimum. (1)

3. $$f(x) = \begin{cases} -1 & \text{if } x \le -2 \\ x+1 & \text{if } -2 < x \le 2 \\ 1 & \text{if } x > 2 \end{cases}$$

Explanation: for $x \le -2$ we see a graph of horizontal line $\boxed{y = -1}$ (1)

for $-2 < x \le 2$, Let's pick two intercepts $(0,1)$ and $(-1,0)$. $\therefore m = \frac{0-1}{-1-0} = 1$

$\therefore y = m(x+1) \Rightarrow \boxed{y = x+1}$ (1)

for $x > 2$, we see graph of another horizontal line $\boxed{y = 1}$ (1)