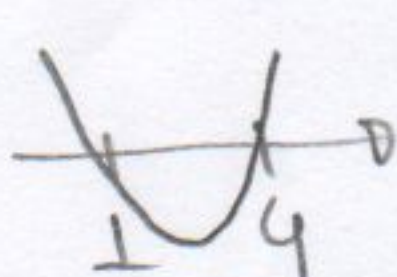


Question 7:

(7)

$$f(x) = \begin{cases} \frac{|x^2 - 5x + 4|}{x-1}, & x < 1 \\ ax + b, & 1 \leq x < 2 \\ \frac{\sqrt{x} - \sqrt{2} + \sqrt{x-2}}{\sqrt{x^2-4}}, & x \geq 2 \end{cases}$$

(a) Dom $f_1 = \mathbb{R} - \{1, 4\}$

$$\frac{|x^2 - 5x + 4|}{x-1} = \begin{cases} \frac{x^2 - 5x + 4}{x-1} = \frac{(x-1)(x-4)}{x-1} = x-4, & x < 1 \text{ or } x > 4 \\ -\frac{(x^2 - 5x + 4)}{x-1} = -(x-4), & 1 < x < 4 \end{cases}$$


$$\lim_{x \rightarrow 1^+} \frac{|x^2 - 5x + 4|}{x-1} = \lim_{\substack{x \rightarrow 1^+ \\ (x > 4)}} \frac{|x^2 - 5x + 4|}{x-1} = -(x-4) = -(1-4) = -(-3) = 3$$

$$\lim_{x \rightarrow 1^-} \frac{|x^2 - 5x + 4|}{x-1} = \lim_{\substack{x \rightarrow 1^- \\ (x < 1)}} \frac{|x^2 - 5x + 4|}{x-1} = x-4 = 1-4 = -3$$

$$\Rightarrow \not\exists \lim_{x \rightarrow 1} f_1(x)$$