

$$D_f = [-2, 4] \Rightarrow \text{~~3x+2~~} -2 \leq f(x) \leq 4$$

$$\Rightarrow -2 \leq \frac{3x+2}{5} \leq 4 \rightarrow -10 \leq 3x+2 \leq 20 \rightarrow -12 \leq 3x \leq 18$$

$$\Rightarrow D_{f(\frac{3x+2}{5})} = [-4, 6]$$

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$$-2 \leq f(x) \leq 3 \rightarrow -6 \leq 3x \leq 7 \rightarrow -8 \leq 3x-2 \leq 7$$

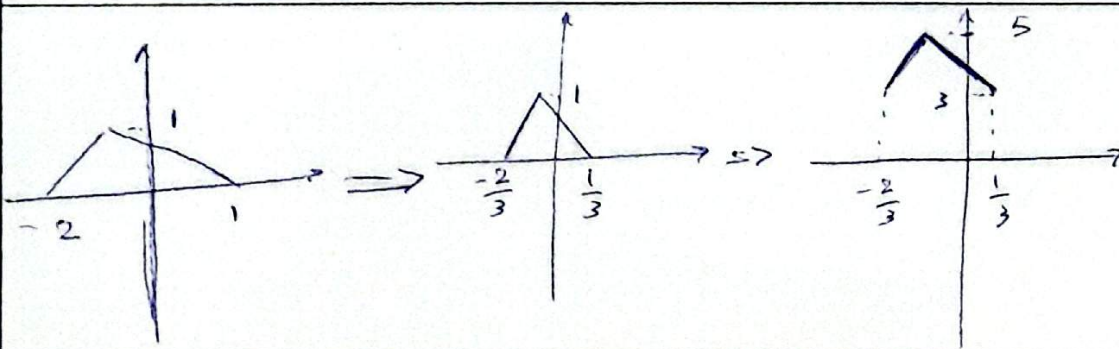
$$\Rightarrow D_{f(x)} = [-8, 7]$$

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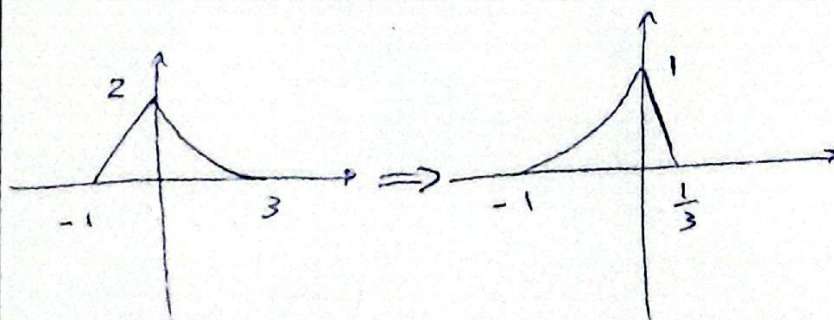
$$f\left(\frac{3x+1}{2}\right) \begin{cases} x=1 \rightarrow \frac{3(-1)+1}{2} = -1 \\ x=3 \rightarrow \frac{3(3)+1}{2} = 5 \end{cases} \Rightarrow D_{f(x)} = [-1, 5]$$

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$$-1 \leq 2-5x \leq 5 \rightarrow -3 \leq -5x \leq 3 \rightarrow -\frac{3}{5} \leq x \leq \frac{3}{5} \Rightarrow D_g = \left[-\frac{3}{5}, \frac{3}{5}\right]$$



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$$S(4,3) \rightarrow y = a(x-h) + k \quad \begin{matrix} a = -\frac{1}{3} \\ h = 4, k = 3 \end{matrix} \rightarrow y = -\frac{1}{3}(x-4)^2 + 3$$

$$\text{Solving } y: -\frac{1}{3}(x-4)^2 + 3 = 0 \rightarrow x-4 = \pm 3 \rightarrow \begin{matrix} x = 1 \\ x = 7 \end{matrix}$$

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$$\text{Let } y=0 \Rightarrow a(x-1)^2 + 4 \rightarrow (\pm 2)^2 a = -4 \Rightarrow a = -1$$

$$f(x) = -(x-1)^2 + 4$$

$$\text{f(1)} \rightarrow 3x+2=1 \rightarrow x = -\frac{1}{3} \quad \left\{ \text{S}_y: 1-2f(1) = 1-2(4) = -7 \right\}$$

$$\text{Solving } \begin{cases} -\frac{1}{3} = \alpha \\ -7 = \beta \end{cases} \Rightarrow \alpha\beta = (-\frac{1}{3})(-7) = \frac{7}{3}$$

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$$a \leq x-1 \leq 4, -1 \leq x+1 \leq b \rightarrow a+1 \leq x \leq 5, -2 \leq x \leq b-1$$

$$\Rightarrow D_{g \cap f} = (-2, 5) \Rightarrow \begin{cases} a+1 = -2 \Rightarrow a = -3 \\ b-1 = 5 \Rightarrow b = 6 \end{cases}$$

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$$R_g \subseteq R_f \neq [-1, 2], \quad D_f = [-\frac{1}{2}, \frac{7}{2}]$$

$$D_{g_2} = D_f = [-\frac{1}{2}, \frac{7}{2}]$$

$$\begin{cases} f(x) \sim [-1, 2] \\ 2f(x)-3 \sim [-5, 1] \\ |2f(x)-3| \sim [0, 1] \end{cases}$$

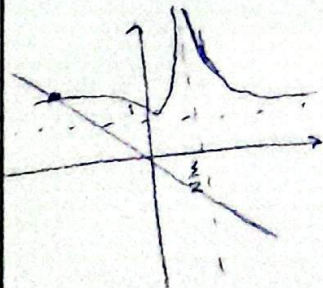
$$\sqrt{|2f(x)-3|} \sim [0, 1]$$

$$R_{g_2} = [0, 1]$$

$$\left(-\infty, \frac{1-\sqrt{7}}{2} \right]$$

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$$f(x) \rightarrow f(x-2)+1 \rightarrow \left| \frac{(x-2)+1}{2(x-2)+1} \right| + 1 = \left| \frac{x-1}{2x-3} \right| + 1$$



$$\frac{x-1}{2x-3} \leq x+1 \rightarrow 2x^2 - 2x - 3 \geq 0$$

$$\Rightarrow \Delta: \frac{2 \pm \sqrt{28}}{4} = \frac{2 \pm 2\sqrt{7}}{4} = \frac{1 \pm \sqrt{7}}{2}$$

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