

Sample Question Set 02

Given: $f(x) = \frac{1}{2x-1}$

Q1. $\frac{f(x+h) - f(x)}{h}$

replace x by $(x+h)$

$$= \frac{\frac{1}{2(x+h)-1} - \frac{1}{2x-1}}{h} \leftarrow \frac{\frac{A}{B}}{C} = \frac{A}{B} \times \frac{1}{C}$$

$$= \left(\frac{1}{2(x+h)-1} - \frac{1}{2x-1} \right) \times \frac{1}{h}$$

$$= \frac{(2x-1) - (2(x+h)-1)}{(2(x+h)-1)(2x-1)} \times \frac{1}{h}$$

$$= \frac{2x-1 - (2x+2h-1)}{(2x+2h-1)(2x-1)} \times \frac{1}{h}$$

$$= \frac{\cancel{2x} - 1 - \cancel{2x} - 2h + 1}{(2x+2h-1)(2x-1)} \times \frac{1}{h}$$

$$= \frac{-2h}{(2x+2h-1)(2x-1)} \times \frac{1}{h} \quad h \neq 0$$

$$= \frac{-2}{(2x+2h-1)(2x-1)} \quad \#$$

$$Q2 \quad \frac{f(x) - f(2)}{x - 2} = \frac{\left[\frac{1}{2x-1} - \frac{1}{2(2)-1} \right]}{x-2}$$

$$= \frac{\left(\frac{1}{2x-1} - \frac{1}{3} \right)}{x-2} = \frac{\left(\frac{3}{3(2x-1)} - \frac{2x-1}{3(2x-1)} \right)}{x-2}$$

$$= \frac{3 - (2x-1)}{3(2x-1)} \quad \leftarrow \quad \frac{\frac{A}{B}}{C} = \frac{A}{B} \times \frac{1}{C}$$

$$= \frac{3 - (2x-1)}{3(2x-1)} \times \frac{1}{x-2} = \frac{A}{BC}$$

$$= \frac{3 - 2x + 1}{3(2x-1)} \times \frac{1}{x-2}$$

$$= \frac{-2x + 4}{3(2x-1)} \times \frac{1}{x-2} = \frac{-2(\cancel{x-2})}{3(2x-1)} \times \frac{1}{\cancel{(x-2)}}$$

$$= \frac{-2}{3(2x-1)} \quad \# \quad x \neq 2$$