Examples: Find domain and range of the following functions:

a) $f(x) = \frac{1}{x-2}$ b) $f(x) = \frac{1}{2x+1}$

Solution: a) Given that

$$f(x) = \frac{1}{x-3}$$

f(x) gives real values for all real values of x except $x = 3$

$D_f = \mathbb{R} - \{3\}$

Again, $y = f(x) = \frac{1}{x-3}$

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

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

x gives real values for all real values of y except 0.

$R_f = \mathbb{R} - \{0\}$

b) Given that

$$f(x) = \frac{1}{2x+1}$$

Here $f(x)$ is not defined for $2x + 1 = 0$ or $x = -\frac{1}{2}$ and f(x) gives real values for all real values of x except $x = -\frac{1}{2}$.

$D_f = \mathbb{R} - \{-\frac{1}{2}\}$

Again, $y = f(x) = \frac{1}{2x+1}$

$\Rightarrow 2x + 1 = \frac{1}{y}$

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

x gives real values for all real values of y except $y = 0$.

$R_f = \mathbb{R} - \{0\}$