(Q1)

(a)

$D = \mathbb{R} \setminus \{-2\}$

(b)

The range of $f(x)$ is $(-\infty, 3) \cup (3, \infty) = \mathbb{R} \setminus \{3\}$.

Proof. Let

$$y = f(x) = \frac{3x-1}{x+2},\ x \in D,\ y \in \mathbb{R}$$

We can derive a function from f where the range of f becomes the domain of the function, by making x the subject of the equation.

Thus,

$$\begin{aligned} y = f(x) &= \frac{3x-1}{x+2} \\ \implies yx - 2y &= 3x + 1 \\ \implies yx - 3x &= 2y + 1 \\ \implies x(y-3) &= 2y + 1 \\ \implies x &= \frac{2y+1}{y-3} \end{aligned}$$

From this we can deduce that y is defined for all $\mathbb{R}$ except $y = 3$, which is the set $\mathbb{R} \setminus \{3\}$. ■