(1) We start by calculating the reverse function

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

so, $f^{-1}(y) = \frac{1}{y} + 2$

(2) Is $f^{-1}(x)$ defined on domain $\mathbb{R}$ (co-domain of $f$)?

→ No, it is not defined for $y = 0$

⇒ $f: \mathbb{R} - \{2\} \to \mathbb{R}$ is not surjective

(3) However $f : \mathbb{R} - \{2\} \to \mathbb{R} - \{0\}, f(x) = \frac{1}{x-2}$

and $f^{-1} : \mathbb{R} \cdot \{0\} \to \mathbb{R} - \{2\}, f^{-1}(x) = \frac{1}{y} + 2$

are inverse functions ⇒ they are both bijective

Checking if functions are the inverse of one another

(1) $f\left(f^{-1}(y)\right), for y \in \mathbb{R} - \{0\}$

(2) $f^{-1}(f(x)), for x \in \mathbb{R} - \{2\}$

$$f(x) = x + 2$$