Replacement Property

Find $\lim_{x \to 1} \frac{x^2-1}{x-1}$

$$= \lim_{x \to 1} x^2 - 1 \quad \text{①}$$

$$\lim_{x \to 1} x - 1$$

Check for dividing by 0 ↑ This is going to be undefined if I plug in 1 using substitution

$$\lim_{x \to 1} \frac{x^2-1}{x-1} \quad \text{Factor} \quad \text{②}$$

$$\frac{(x+1)(x-1)}{x-1} \quad \text{③}$$

$\frac{x^2-1}{x-1} = (x+1)$, where $x \neq 1$

I can replace $(x+1)$ with $\frac{x^2-1}{x-1}$

④

$$\lim_{x \to 1} \frac{x^2-1}{x-1} = \lim_{x \to 1} (x+1)$$

$$= \lim_{x \to 1} x + \lim_{x \to 1} 1$$

$$= 1 + 1$$

$$= 2$$

So, $\boxed{\lim_{x \to 1} \frac{x^2-1}{x-1} = 2}$