

Question 9

Let

$$f(x) = \begin{cases} \frac{x^2-4}{x-2}, & x \neq 2 \\ k, & x = 2 \end{cases}$$

Determine the value of k such that $f(x)$ is continuous at $x = 2$.

Question 9 - Solution

We want f to be continuous at $x = 2$, so we must have:

$$\lim_{x \rightarrow 2} f(x) = f(2) = k$$

First, compute the limit:

$$f(x) = \frac{x^2 - 4}{x - 2} = \frac{(x - 2)(x + 2)}{x - 2}$$

For $x \neq 2$, we can cancel the common factor:

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

Therefore:

$$\lim_{x \rightarrow 2} f(x) = \lim_{x \rightarrow 2} (x + 2) = 4$$

To make f continuous at $x = 2$, we set:

$$\boxed{k = 4}$$