

Question 2

Evaluate the limit:

$$\lim_{x \rightarrow 3} \frac{x^2 - 9}{x - 3}$$

Question 2 - Solution

We are given:

$$\lim_{x \rightarrow 3} \frac{x^2 - 9}{x - 3}$$

Step 1: Check for indeterminate form.

At $x = 3$, the numerator becomes:

$$x^2 - 9 = 9 - 9 = 0$$

The denominator becomes:

$$x - 3 = 0$$

So we have the indeterminate form $\frac{0}{0}$. We must simplify.

Step 2: Factor the numerator.

$$x^2 - 9 = (x - 3)(x + 3)$$

$$\Rightarrow \frac{(x - 3)(x + 3)}{x - 3}$$

Cancel the common factor $x - 3$ (note: this is valid for $x \neq 3$):

$$= x + 3$$

Step 3: Take the limit of the simplified expression.

$$\lim_{x \rightarrow 3} x + 3 = 3 + 3 = \boxed{6}$$

Final Answer: $\boxed{6}$