

Problem

Evaluate the limit when x approaches 0:

$$\lim_{x \rightarrow 0} \frac{4x + 4}{x}$$

Solution

As x approaches 0, both the numerator and the denominator approach 0. This is an indeterminate form of $\frac{0}{0}$. We can not simplify the fraction and if we take it by parts you'll be left with $\frac{4}{x}$, which goes to infinity as x approaches 0. However, we can apply L'Hôpital's Rule to evaluate this limit.

First, we'll take the derivatives of the numerator and the denominator separately:

$$f(x) = 4x + 4, \quad g(x) = x$$

$$f'(x) = 4, \quad g'(x) = 1$$

Now, we'll rewrite the limit using these derivatives:

$$\lim_{x \rightarrow 0} \frac{f'(x)}{g'(x)} = \lim_{x \rightarrow 0} \frac{4}{1} = 4$$

Hence the limit goes to 4 when x approaches 0.

The answer is **4**.

Answer: 4