

Solution and Rubric for Quiz 2 (Mon Sep 8)

Problem:

- (a) Compute $\lim_{x \rightarrow 3^-} \frac{2}{3-x}$.
- (b) Compute $\lim_{x \rightarrow 3^+} \frac{2}{3-x}$.

Solution for (a):

When $x = 3$, the denominator is zero and the numerator is not. Therefore we expect an infinite limit (∞ or $-\infty$).

When x is slightly less than 3, the denominator $(3 - x)$ is a small positive number. Dividing 2 by this we get a *large positive* number. Thus

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

Rubric for (a):

- Correct answer fully supported by clear and correct work: 1 point
- Otherwise: 0 points

Common mistakes and notes for (a):

- As on homework and exams, writing a final answer with no work or justification is not acceptable. In this case, any statement indicating that the denominator is *positive* and *small* when x approaches 3 from the left is sufficient. Alternatively, a reasonably accurate graph of the function or a table of values could be given.

Solution to (b):

When x is greater than 3, the denominator $(3 - x)$ is a small negative number. Dividing 2 by this we get a *large negative* number. Thus

$$\lim_{x \rightarrow 3^+} \frac{2}{3-x} = -\infty$$

Rubric for (b):

- Correct answer fully supported by clear and correct work: 1 point
- Otherwise: 0 points

Common mistakes and notes for (b):

- As before, some justification is required.
- A common mistake is to have the wrong sign for the denominator, thus interchanging the answers to (a) and (b). Despite seeming like a minor mistake, identifying the sign of the function is the key point in problems like this one (one-sided infinite limits) and thus such a mistake is not eligible for partial credit.