

Limit **REVIEW**



Determine the **LIMIT** for the following function as x approaches the designated values.

$$a) \lim_{x \rightarrow 0} \frac{x+5}{x^2-25}$$

$$b) \lim_{x \rightarrow -5} \frac{x+5}{x^2-25}$$

$$c) \lim_{x \rightarrow 5^-} \frac{x+5}{x^2-25}$$

$$d) \lim_{x \rightarrow 5^+} \frac{x+5}{x^2-25}$$

$$e) \lim_{x \rightarrow 5} \frac{x+5}{x^2-25}$$

SOLUTIONS

$$a) \lim_{x \rightarrow 0} \frac{x+5}{x^2-25} = -\frac{1}{5}$$

The function is continuous at ($x = 0$).

$$b) \lim_{x \rightarrow -5} \frac{x+5}{x^2-25} = \lim_{x \rightarrow -5} \frac{x+5}{\cancel{(x+5)}(x-5)} = \frac{1}{-10} = -\frac{1}{10}$$

The function has a hole at $(-5, -\frac{1}{10})$, BUT the lim still exists!

SOLUTIONS

$$c) \lim_{x \rightarrow 5^-} \frac{x+5}{x^2-25} = \lim_{x \rightarrow 5^-} \frac{x+5}{(x+5)(x-5)} = \frac{1}{x-5} = -\infty \quad f(4.99) = -100$$

The function has a VA at $x = 5$, BUT the lim still exists!

$$d) \lim_{x \rightarrow 5^+} \frac{x+5}{x^2-25} = \lim_{x \rightarrow 5^+} \frac{x+5}{(x+5)(x-5)} = \frac{1}{x-5} = \infty \quad f(5.01) = 100$$

The function has a VA at $x = 5$, BUT the lim still exists!

$$e) \lim_{x \rightarrow 5} \frac{x+5}{x^2-25} = \lim_{x \rightarrow 5} \frac{x+5}{(x+5)(x-5)} = \frac{1}{x-5} = DNE$$

The left side lim does not match the right side lim, \therefore the lim does not exist!