

Quiz 2: Math 135, Section C7

Compute the following limits:

1. $\lim_{x \rightarrow 3} (x + 5)(2x - 7)$
2. $\lim_{x \rightarrow 2} \frac{x^2 - 4x + 4}{x^2 - x - 2}$
3. $\lim_{x \rightarrow -3^+} \frac{|x + 3|}{x + 3}$
4. $\lim_{x \rightarrow -3^-} \frac{|x + 3|}{x + 3}$
5. $\lim_{x \rightarrow -3} \frac{|x + 3|}{x + 3}$
6. $\lim_{x \rightarrow 0} \frac{\sin 4x}{9x}$

Solutions

1.

$$\lim_{x \rightarrow 3} (x + 5)(2x - 7) = (3 + 5)(2(3) - 7) = -8$$

2.

$$\lim_{x \rightarrow 2} \frac{x^2 - 4x + 4}{x^2 - x - 2} = \lim_{x \rightarrow 2} \frac{(x - 2)(x - 2)}{(x - 2)(x + 1)} = \lim_{x \rightarrow 2} \frac{x - 2}{x + 1} = \frac{2 - 2}{2 + 1} = 0$$

3. Since $x + 3$ is positive when $x > -3$, then we have

$$\lim_{x \rightarrow -3^+} \frac{|x + 3|}{x + 3} = \lim_{x \rightarrow -3^+} \frac{x + 3}{x + 3} = \lim_{x \rightarrow -3^+} 1 = 1$$

4. Since $x + 3$ is negative when $x < -3$, then we have

$$\lim_{x \rightarrow -3^-} \frac{|x + 3|}{x + 3} = \lim_{x \rightarrow -3^-} \frac{-(x + 3)}{x + 3} = \lim_{x \rightarrow -3^-} -1 = -1$$

5. Since

$$\lim_{x \rightarrow -3^+} \frac{|x + 3|}{x + 3} \neq \lim_{x \rightarrow -3^-} \frac{|x + 3|}{x + 3}$$

then

$\lim_{x \rightarrow -3} \frac{|x+3|}{x+3}$ does not exist.

6.

$$\lim_{x \rightarrow 0} \frac{\sin 4x}{9x} = \lim_{x \rightarrow 0} \frac{\sin 4x}{4x} \cdot \frac{4}{9} = 1 \cdot \frac{4}{9} = \frac{4}{9}$$