Warm-up Problems

1. Find the limits:
   (a) \( \lim_{x \to 0} \frac{\sin x}{x} = \)
   (b) \( \lim_{x \to 0} \frac{1 - \cos x}{x} = \)

2. Find the limits:
   (a) \( \lim_{x \to \infty} \frac{1}{x} = \)
   (b) \( \lim_{x \to \infty} 1 = \)
   (c) \( \lim_{x \to \infty} x = \)

3. Determine the points where the function graphed below is continuous and discontinuous. Be sure to be able to explain why the function is continuous or discontinuous.

Lecture Problems

4. Using \( \lim_{x \to 0} \frac{\sin x}{x} = 1 \), find the following limits
   (a) \( \lim_{x \to 0} \frac{\sin x}{2x} = \)
   (b) \( \lim_{x \to 0} \frac{\sin 2x}{x} = \)
   (c) \( \lim_{x \to 0} \frac{\tan 2x}{x} = \)

5. Find the limits
   (a) \( \lim_{x \to \infty} \frac{4x^2 + 1}{3x^2 + x - 1} = \)
   (b) \( \lim_{x \to \infty} \frac{4x^7 + 1}{3x^7 + x - 1} = \)
   (c) \( \lim_{x \to \infty} \frac{4x^6 + 1}{3x^7 + x - 1} = \)
   (d) \( \lim_{x \to \infty} \frac{4x^8 + 1}{3x^7 + x - 1} = \)
   (e) \( \lim_{x \to \infty} \frac{\sqrt{x + 1} - \sqrt{x - 1}}{x(x+1)(x-1)} = \)
   (f) \( \lim_{x \to \infty} \frac{x + 1}{e^x} = \)