Quiz 1
Math 251

Name:

Show *all* your work (algebraically or geometrically) for each and simplify. No credit is given without supporting work.

1. [2] Neatly sketch the graph of a function f satisfying the following conditions.

$$\lim_{x\to 2} f(x) = -\infty, \quad \lim_{x\to\infty} f(x) = \infty, \quad \lim_{x\to-\infty} f(x) = 0, \quad \lim_{x\to 0^+} f(x) = \infty, \quad \lim_{x\to 0^-} f(x) = -\infty$$

2. [3] Find the limit if it exists, or explain why it does not exist.

$$\lim_{x\to 2} \frac{x^2+x-6}{x-2} \qquad \lim_{x\to -4} \frac{4^{-1}+x^{-1}}{4+x} \qquad \lim_{x\to\infty} (e^{-2x}\cos x)$$

3. [2] Define what it means for the function f to be continuous at the point a.

4. Let $g(x) = \begin{cases} x+1 & \text{if } x \leq 0, \\ \ln x & \text{if } 0 < x < \pi, \\ \sin x & \text{if } x \geq \pi. \end{cases}$

   (a) [2] Neatly sketch the graph of g.

   (b) [1] List all numbers at which g has a discontinuity.