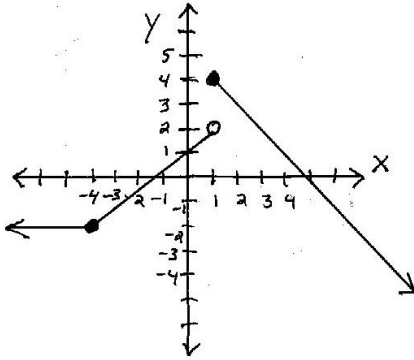


Homework 3
Due 9/20/2010 in class

This cover sheet must be attached as the top page of your homework.

1. Given the function $f(x)$ defined by the following graph:



- (a) Evaluate the following limits if they exist:
 $\lim_{x \rightarrow -4} f(x)$, $\lim_{x \rightarrow 1^-} f(x)$, $\lim_{x \rightarrow 1^+} f(x)$, $\lim_{x \rightarrow 1} f(x)$.
- (b) Is $f(x)$ continuous at the point $x = -4$? Explain why or why not.
- (c) Is $f(x)$ continuous at the point $x = 1$? Explain why or why not.
- (d) Is $f(x)$ continuous on the interval $(-4, 1)$? Explain why or why not.
- (e) Is $f(x)$ continuous on the interval $[-4, 1]$? Explain why or why not.
2. Evaluate the limit:

$$\lim_{x \rightarrow 0} \frac{\sin 4x}{9x}.$$

3. Evaluate the limit:

$$\lim_{x \rightarrow 0} \frac{x^2 \cos 2x}{1 - \cos x}.$$

4. Find a constant k so that $f(x)$ is continuous for all x :

$$f(x) = \begin{cases} x^2 - 1, & x < 3 \\ 2kx, & x \geq 3 \end{cases}.$$

5. Show (using one of the theorems from this class) that the following equation has at least one solution on the given interval. Clearly state the theorem you are using and explain why it applies in this case:

$$\cos x = x^2 - 1 \quad \text{on} \quad (0, \pi).$$

6. Show using the formal definition of the limit (epsilon-delta definition) that

$$\lim_{x \rightarrow 3} (4x - 2) = 10.$$