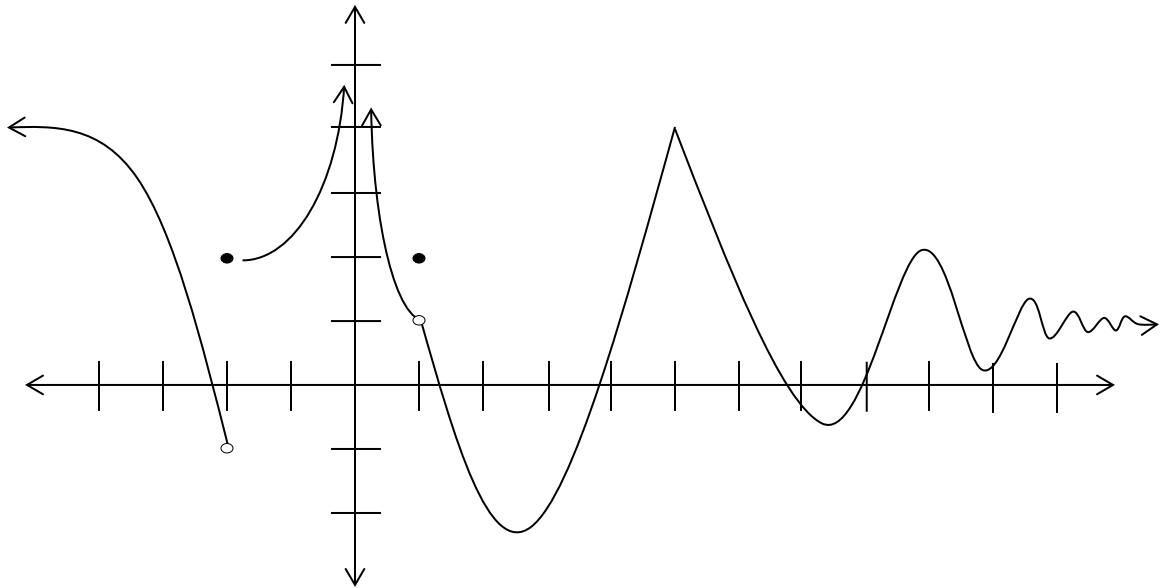


# Homework Set 14

## Calculating Limits using Graphs

(sections 1.3 & 1.6)

1. For the function  $f(x)$ , whose graph is shown below, find each value of the quantities listed below the graph. If the quantity does not exist, explain why.



$$\lim_{x \rightarrow \infty} f(x) =$$

$$\lim_{x \rightarrow 1^-} f(x) =$$

$$\lim_{x \rightarrow -2^-} f(x) =$$

$$\lim_{x \rightarrow 1^+} f(x) =$$

$$\lim_{x \rightarrow -2^+} f(x) =$$

$$\lim_{x \rightarrow 1} f(x) =$$

$$\lim_{x \rightarrow -2} f(x) =$$

$$f(1) =$$

$$f(-2) =$$

$$\lim_{x \rightarrow 5} f(x) =$$

$$\lim_{x \rightarrow 0} f(x) =$$

$$\lim_{x \rightarrow -\infty} f(x) =$$

Where is the function discontinuous?

On which intervals is the function continuous?

2. Sketch the graph of  $f$  and use it to determine the values of  $a$  for which  $\lim_{x \rightarrow a} f(x)$  exists.

$$f(x) = \begin{cases} 1 - x & \text{if } x < -1 \\ x & \text{if } -1 \leq x \leq 1 \\ \sin(x - 1) & \text{if } x > 1 \end{cases}$$

3. Sketch the graph of a function  $f$  that satisfies the following conditions:

$$\lim_{x \rightarrow 0} f(x) = \infty, \quad \lim_{x \rightarrow 3^-} f(x) = -2, \quad \lim_{x \rightarrow 3^+} f(x) = 2, \\ f(0) \text{ is undefined, and } f(3) = 1$$

4. Explain in your own words what  $\lim_{x \rightarrow 2} f(x) = 5$  means. Is it possible for  $f(2) = 5$ ?
5. Explain in your own words what it means for  $\lim_{x \rightarrow 1^-} f(x) = 3$  and  $\lim_{x \rightarrow 1^+} f(x) = 7$ . Is it possible for  $\lim_{x \rightarrow 1} f(x)$  to exist? Why or why not? If it exists, what does  $\lim_{x \rightarrow 1} f(x)$  equal?