

**1.)**

For each of the functions listed, **(i)** identify any points of discontinuity and **(ii)** say whether it is continuous from the left, right, or neither.

**a.)**

$$f(x) = \frac{x+4}{2x^2+7x-4}$$

**b.)**

$$f(x) = \frac{x^2-1}{x^2+1}$$

**c.)**

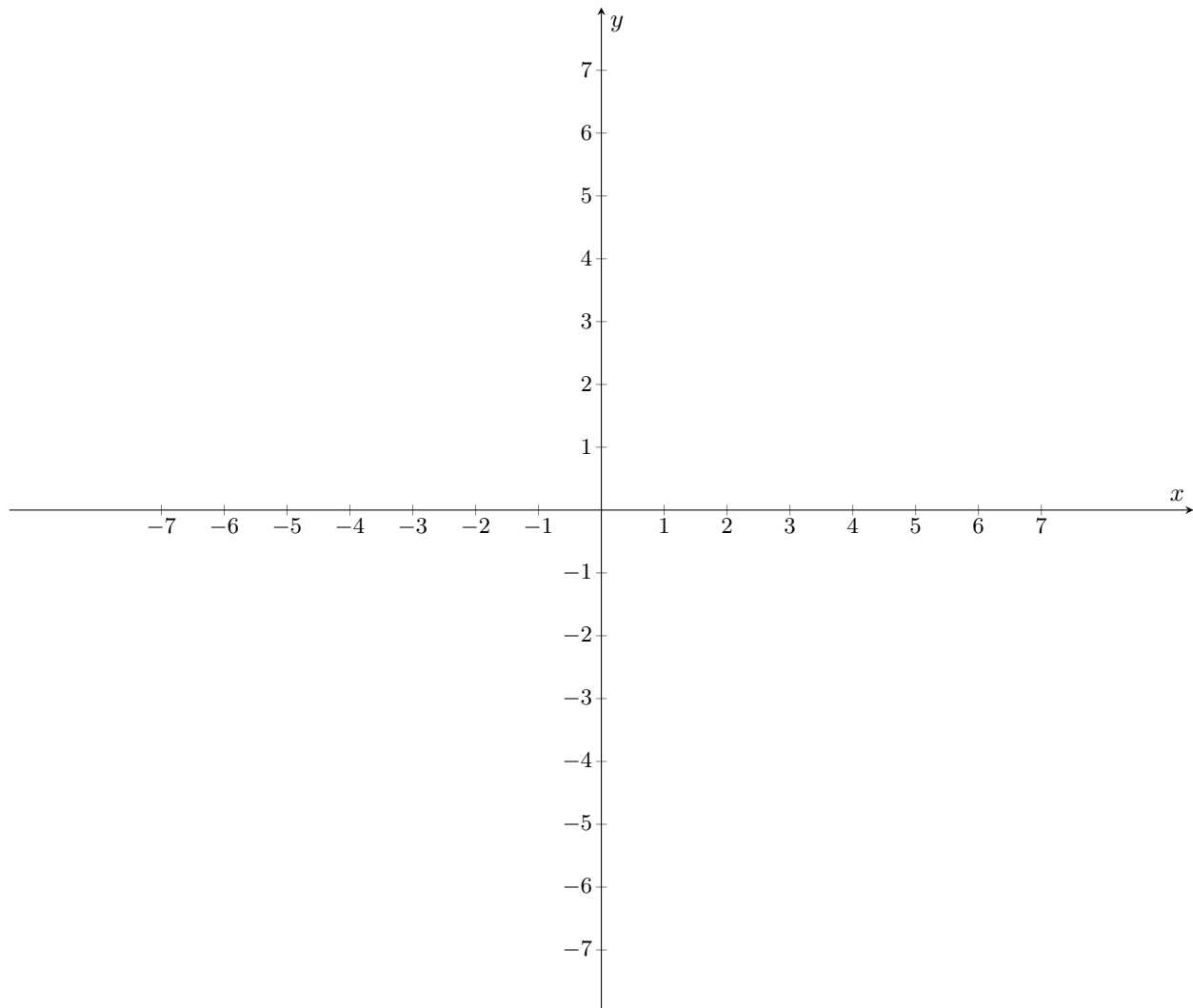
$$f(x) = \begin{cases} \sqrt{1-x} & x \leq 1 \\ \frac{2x^3-2}{x-2} & 1 < x \leq 3 \\ 52 \sin(\pi x) & 3 < x \end{cases}$$

**2.)**

Sketch a graph  $y = f(x)$  for a function  $f$  satisfying *all* of the following properties (you do not need to provide a formula for  $f$  unless you want to):

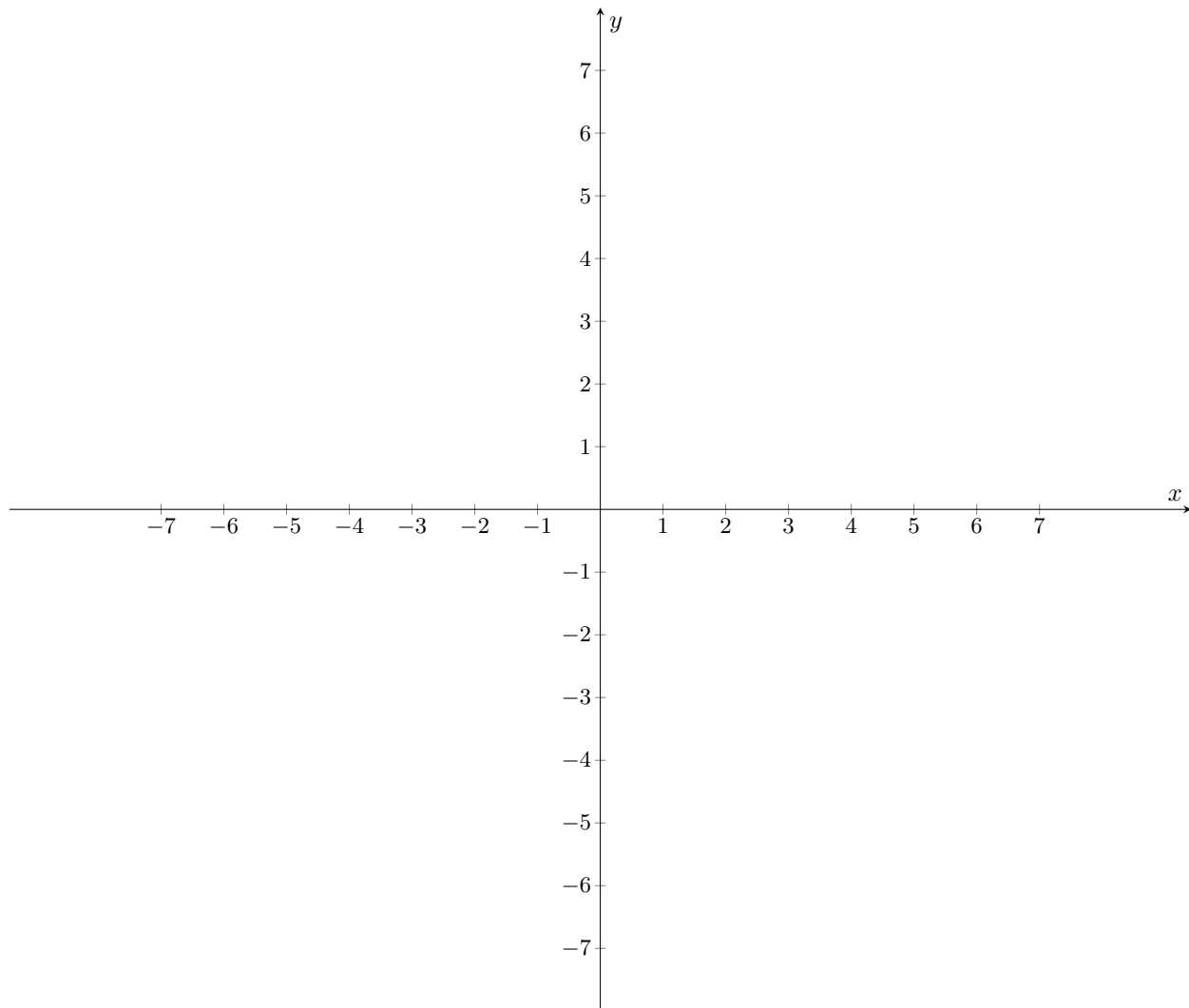
**a.)**

$\lim_{x \rightarrow -\infty} f(x) = 0$ ,  $\lim_{x \rightarrow -2^+} f(x) = 3$ ,  $\lim_{x \rightarrow -2^-} f(x) = -3$ ,  $\lim_{x \rightarrow 3} f(x) = -\infty$ ,  $f$  is continuous *from the right* at  $x = -3$



**b.)**

$\lim_{x \rightarrow -\infty} f(x) = -3$ ,  $\lim_{x \rightarrow -1^+} f(x) = -2$ ,  $\lim_{x \rightarrow 0} f(x) = -\infty$ ,  $\lim_{x \rightarrow 2} f(x) = 3$ ,  $f(2) = 6$ ,  
 $\lim_{x \rightarrow \infty} f(x) = 2$ , there are only two real numbers at which  $f$  is *not* continuous.



**3.)**

Evaluate the following limits.

**a.)**

$$\lim_{x \rightarrow 2} \frac{1}{x-2}$$

**b.)**

$$\lim_{x \rightarrow 2} \frac{1}{(x-2)^2}$$

**c.)**

$$\lim_{x \rightarrow \infty} \frac{2+5x^2}{1+x-x^2}$$

**d.)**

$$\lim_{x \rightarrow -\infty} \frac{1-x^6}{1+x^5}$$

**e.)**

$$\lim_{x \rightarrow \infty} \frac{\sqrt{1+4x^6}}{2-x^3}$$

**f.)**

$$\lim_{x \rightarrow \infty} e^{-x} \sin^2(x^2)$$