Infinite Calculus Evaluating Limits **Evaluate each limit.**

Name_____

Date_____ Period____

1) $\lim_{x \to -1} 5$

2) $\lim_{x \to -\frac{5}{2}} (-x + 2)$

3) $\lim_{x \to 2} (x^3 - x^2 - 4)$

4) $\lim_{x \to 1} \left(-\frac{x^2}{2} + 2x + 4 \right)$

5) $\lim_{x \to 3} -\sqrt{x + 3}$

6) $\lim_{x \to \frac{3}{2}} -\sqrt{2x + 4}$

7) $\lim_{x \to 1} -\frac{x - 4}{x^2 - 6x + 8}$

8) $\lim_{x \to \frac{3}{2}} \frac{-x - 3}{x^2 + x + 1}$

9) $\lim_{x \to \pi} \sin(x)$

10) $\lim_{x \to \frac{3\pi}{4}} 2\cos(x)$

Critical thinking questions:

11) Give an example of a limit that evaluates to 4.

12) Give an example of a limit of a quadratic function where the limit evaluates to 9.

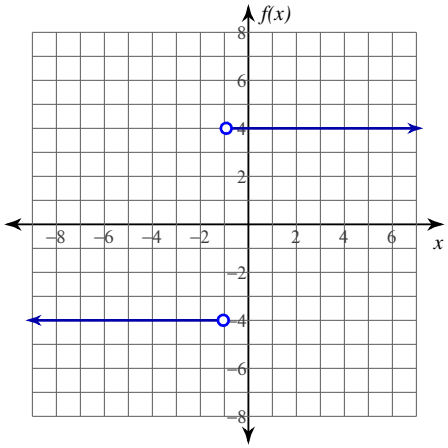
- Infinite Calculus Evaluating

Name_____

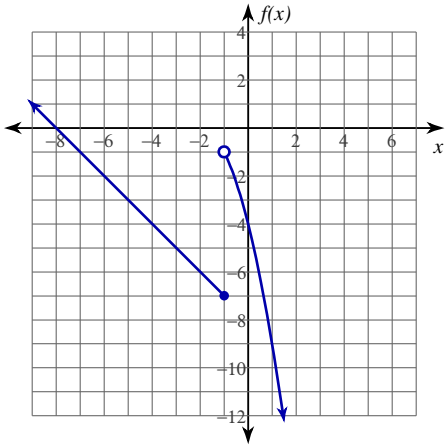
Date_____ Period____

Limits **Evaluate each limit.**

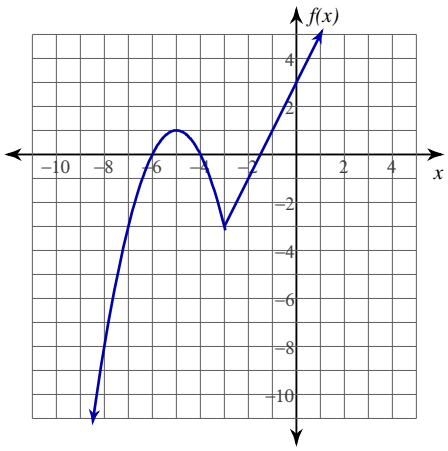
1) $\lim\limits_{x \to -1^+} \dfrac{4x+4}{|x+1|}$



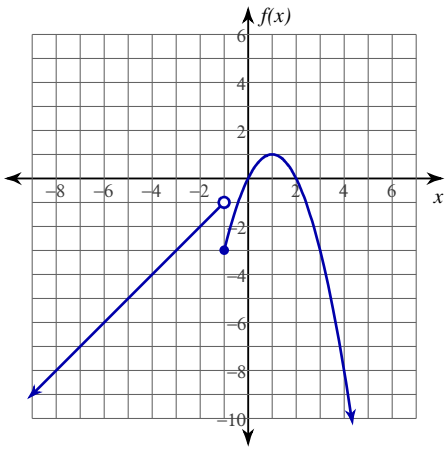
2) $\lim\limits_{x \to -1^-} f(x),\ f(x) = \begin{cases} -x-8, & x \le -1 \\ -x^2-4x-4, & x > -1 \end{cases}$



3) $\lim\limits_{x \to -3} f(x),\ f(x) = \begin{cases} -x^2-10x-24, & x \le -3 \\ 2x+3, & x > -3 \end{cases}$

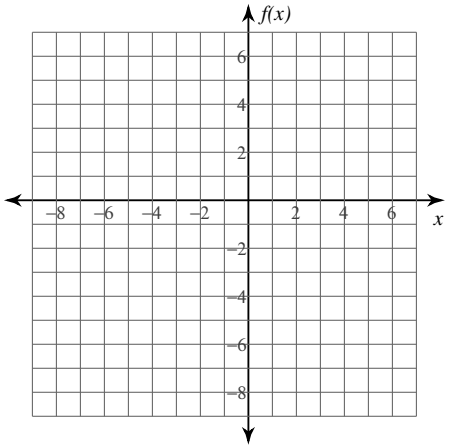


4) $\lim\limits_{x \to -1} f(x),\ f(x) = \begin{cases} x, & x < -1 \\ -x^2+2x, & x \ge -1 \end{cases}$

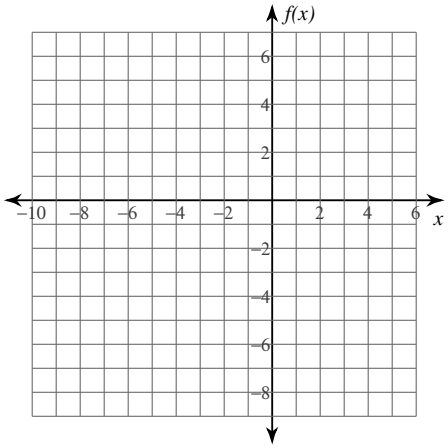


Evaluate each limit. You may use the provided graph to sketch the function.

5) $\lim\limits_{x\to -1^-} f(x),\ f(x)=\begin{cases} -x-3, & x\le -1 \\ x+1, & x>-1 \end{cases}$



6) $\lim\limits_{x\to -2} f(x),\ f(x)=\begin{cases} -x^2-4x-5, & x\le -2 \\ -1, & x>-2 \end{cases}$



Evaluate each limit.

7) $\lim\limits_{x\to 0^+} f(x),\ f(x)=\begin{cases} 1, & x\le 0 \\ -x^2+4x-3, & x>0 \end{cases}$

8) $\lim\limits_{x\to 0^-} \dfrac{|x|}{x}$

9) $\lim\limits_{x\to 0^+} \lfloor -2x+1 \rfloor$

10) $\lim\limits_{x\to 1} f(x),\ f(x)=\begin{cases} \dfrac{x}{2}+\dfrac{9}{2}, & x<1 \\ x^2-6x+10, & x\ge 1 \end{cases}$

11) $\lim\limits_{x\to -1} \dfrac{3|x+1|}{x+1}$

12) $\lim\limits_{x\to -2} f(x),\ f(x)=\begin{cases} x^2, & x\le -2 \\ -\dfrac{x}{2}+3, & x>-2 \end{cases}$

Critical thinking questions:

13) Give an example of a two-sided limit of a piecewise function where the limit does not exist.

14) Given an example of a two-sided limit of a function with an absolute value where the limit does not exist.

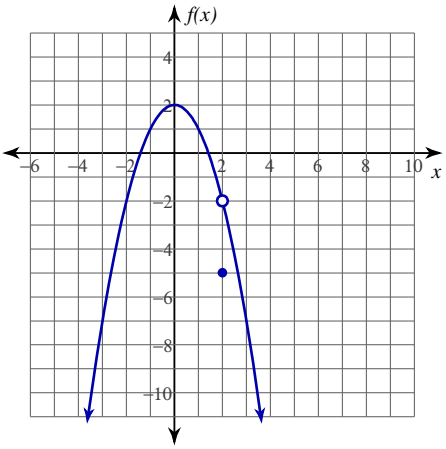
- Infinite Calculus Evaluating

Name_____

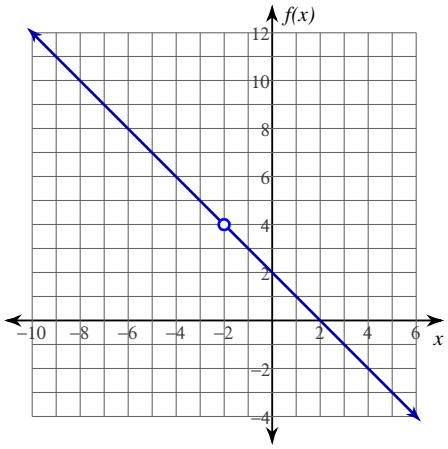
Date_____ Period____

Limits **Evaluate each limit.**

1) $\lim_{x \to 2} f(x),\ f(x) = \begin{cases} -x^2 + 2, & x \neq 2 \\ -5, & x = 2 \end{cases}$

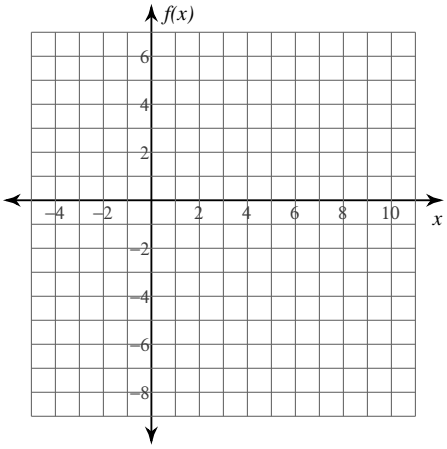


2) $\lim_{x \to -2} -\dfrac{x^2 - 4}{x + 2}$

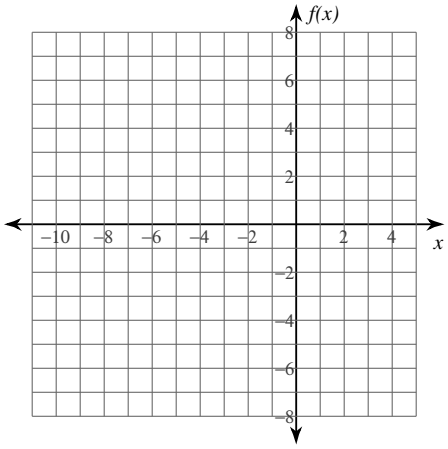


Evaluate each limit. You may use the provided graph to sketch the function.

3) $\lim_{x \to 3} \dfrac{x^2 - 7x + 12}{x - 3}$



4) $\lim_{x \to -3} \dfrac{x + 3}{x^2 + 2x - 3}$



Evaluate each limit.

5) $\lim_{x \to 0} f(x),\ f(x) = \begin{cases} x + 1, & x \neq 0 \\ 2, & x = 0 \end{cases}$

6) $\lim_{x \to 3} f(x),\ f(x) = \begin{cases} 2 + \dfrac{x}{2}, & x \neq 3 \\ 2, & x = 3 \end{cases}$

7) $\lim_{x\to 1} -\dfrac{x^2-1}{x-1}$

8) $\lim_{x\to 5} -\dfrac{x^2-5x}{x-5}$

9) $\lim_{x\to 2} -\dfrac{x^2-x-2}{x-2}$

10) $\lim_{x\to -5} \dfrac{x^2+3x-10}{x+5}$

11) $\lim_{x\to 0} \dfrac{\dfrac{1}{-4+x}+\dfrac{1}{4}}{x}$

12) $\lim_{x\to -3} \dfrac{x}{\dfrac{1}{3+x}-\dfrac{1}{3}}$

13) $\lim_{x\to 5} \dfrac{x-5}{\sqrt{x+4}-3}$

14) $\lim_{x\to 3} \dfrac{\sqrt{x+6}-3}{x-3}$

Critical thinking questions:

15) Give an example of a limit of a rational function where the limit at -1 exists, but the rational function is undefined at -1.

16) Give two values of *a* where the limit cannot be solved using direct evaluation. Give one value of *a* where the limit can be solved using direct evaluation.

$\lim_{x\to a} \dfrac{x}{\dfrac{1}{-2+x}+\dfrac{1}{2}}$

Infinite Calculus Evaluating

Name_____

Date_____ Period____

Limits **Evaluate each limit.**

1) $\lim_{x \to 0} \dfrac{1 - \sin\left(\dfrac{\pi}{2} - x\right)}{x}$

2) $\lim_{x \to 0} \dfrac{\cos\left(\dfrac{\pi}{2} - x\right)}{x}$

3) $\lim_{x \to 0} \dfrac{\tan(x)}{3x}$

4) $\lim_{x \to 0} \dfrac{\sin(x)}{\sin(4x)}$

5) $\lim_{x \to 0} \dfrac{1 - \cos(2x)}{4x}$

6) $\lim_{x \to 0} \dfrac{\sin^2(2x)}{x^2}$

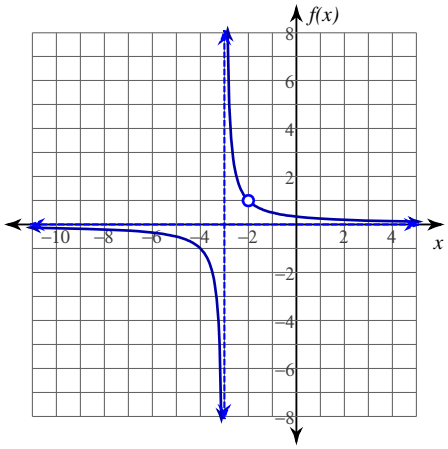
Infinite Calculus Evaluating

Name_____

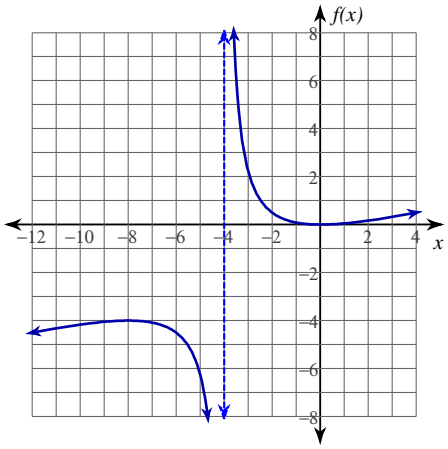
Date_____ Period____

Limits **Evaluate each limit.**

1) $\lim_{x \to -3^+} \dfrac{x+2}{x^2+5x+6}$

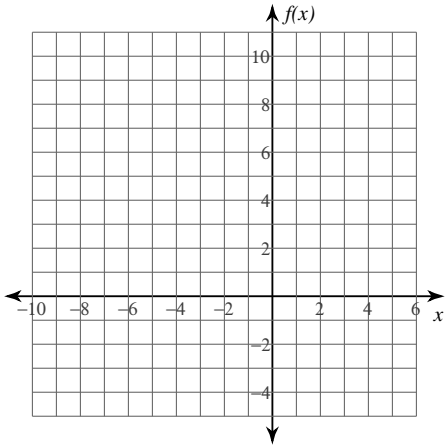


2) $\lim_{x \to -4} \dfrac{x^2}{4x+16}$

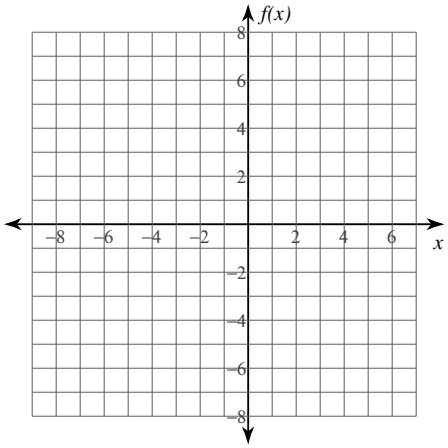


Evaluate each limit. You may use the provided graph to sketch the function.

3) $\lim_{x \to -2^+} \dfrac{3x}{x+2}$



4) $\lim_{x \to -1^+} \dfrac{x^2}{x+1}$



Evaluate each limit.

5) $\lim_{x \to -3^-} \frac{2x}{x+3}$

6) $\lim_{x \to -2^+} \frac{1}{x^2-4}$

7) $\lim_{x \to 3^-} -\frac{4x}{x-3}$

8) $\lim_{x \to 1} -\frac{3}{x-1}$

9) $\lim_{x \to -2^-} \frac{x+2}{x^2+x-2}$

10) $\lim_{x \to -3^-} -\frac{2}{x+3}$

11) $\lim_{x \to \frac{\pi}{4}^-} 2\sec(2x)$

12) $\lim_{x \to \frac{3\pi}{4}^+} 2\tan(2x)$

Critical thinking questions:

13) Give an example of a right-sided limit that goes to ∞ as x goes to 5.

14) Give an example of a left-sided limit that goes to ∞ as x goes to 5.

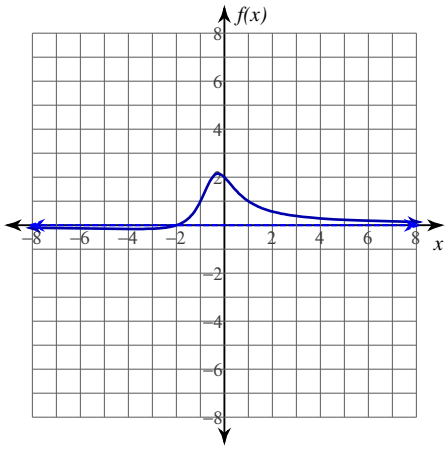
Infinite Calculus Evaluating

Name_____

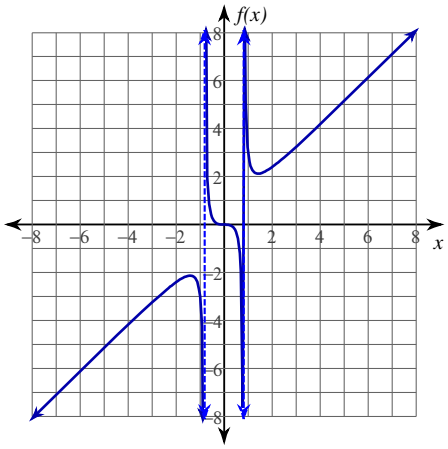
Date_____ Period____

Limits **Evaluate each limit.**

1) $\lim_{x \to -\infty} \frac{x+2}{x^2+x+1}$

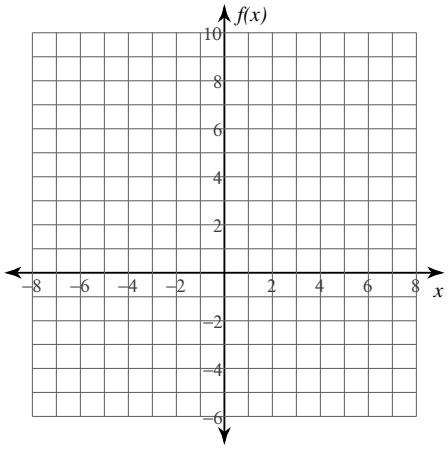


2) $\lim_{x \to -\infty} \frac{3x^3}{3x^2-2}$

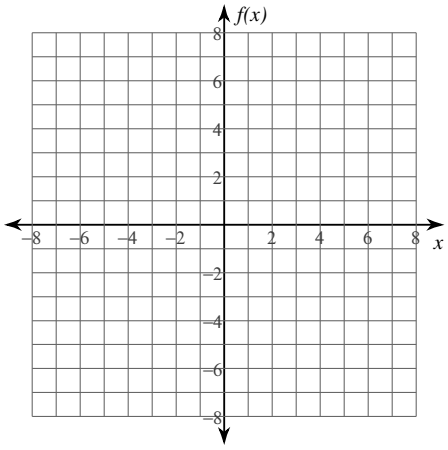


Evaluate each limit. You may use the provided graph to sketch the function.

3) $\lim_{x \to -\infty} \frac{2x^2}{x^2-4}$



4) $\lim_{x \to \infty} -\frac{3x^2}{4x+4}$



Evaluate each limit.

5) $\lim_{x\to-\infty}\left(x^3-4x^2+5\right)$

6) $\lim_{x\to\infty}\dfrac{2x^3}{3x^2-4}$

7) $\lim_{x\to\infty}\dfrac{x^3}{4x^2+3}$

8) $\lim_{x\to\infty}\dfrac{x+1}{2x^2+2x+1}$

9) $\lim_{x\to-\infty}\dfrac{\sqrt{2x^2+3}}{2x+3}$

10) $\lim_{x\to-\infty}\dfrac{\sqrt{2x^2+1}}{4x+2}$

11) $\lim_{x\to\infty}\left(-\dfrac{\ln x}{x^4}+1\right)$

12) $\lim_{x\to\infty}\left(-e^{-3x}-1\right)$

13) $\lim_{x\to\infty}\left(e^x-3\right)$

14) $\lim_{x\to-\infty}-e^{-4x}$

15) $\lim_{x\to\infty}\cos\left(2x\right)$

16) $\lim_{x\to-\infty}\dfrac{x}{\cos\left(-3x\right)}$

17) $\lim_{x\to\infty}-\dfrac{2x}{\cos\dfrac{1}{x}}$

18) $\lim_{x\to\infty}x\cos\dfrac{1}{x}$

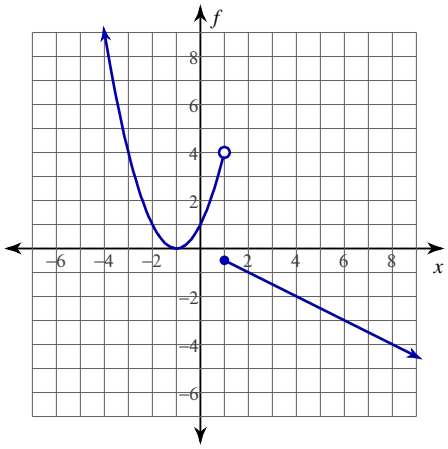
Infinite Calculus Name_____

Continuity

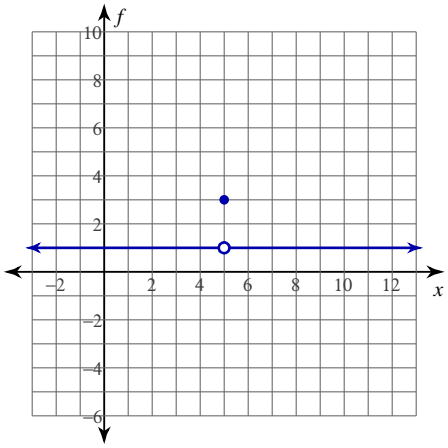
Date_____ Period____

Find the intervals on which each function is continuous.

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

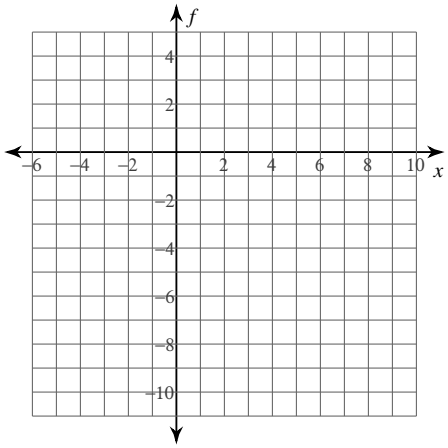


2) $f(x) = \begin{cases} 1, & x \neq 5 \\ 3, & x = 5 \end{cases}$

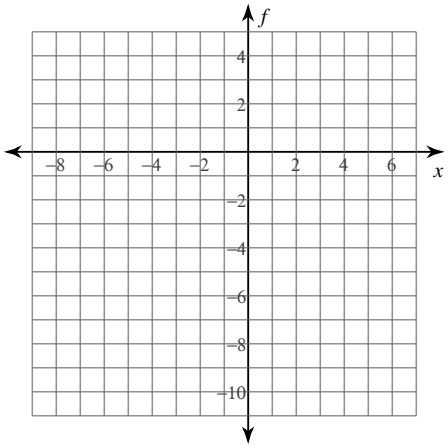


Find the intervals on which each function is continuous. You may use the provided graph to sketch the function.

3) $f(x) = \begin{cases} 2x - 10, & x < 2 \\ 0, & x \geq 2 \end{cases}$



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



Find the intervals on which each function is continuous.

5) $f(x) = \dfrac{x^2}{2x+4}$

6) $f(x) = \begin{cases} -\dfrac{x}{2} - \dfrac{7}{2}, & x \le 0 \\ -x^2 + 2x - 2, & x > 0 \end{cases}$

7) $f(x) = -\dfrac{x^2 - x - 12}{x+3}$

8) $f(x) = \dfrac{x^2 - x - 6}{x+2}$

Determine if each function is continuous. If the function is not continuous, find the *x*-axis location of and classify each discontinuity.

9) $f(x) = -\dfrac{x^2}{2x+4}$

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

11) $f(x) = \dfrac{x+1}{x^2 + x + 1}$

12) $f(x) = -\dfrac{x^2}{x-1}$

13) $f(x) = \begin{cases} x^2 - 4x + 3, & x \ne 0 \\ 3, & x = 0 \end{cases}$

14) $f(x) = \begin{cases} -x^2, & x \ne 1 \\ 0, & x = 1 \end{cases}$

Critical thinking questions:

15) Give an example of a function with discontinuities at $x = 1$, 2, and 3.

16) Of the six basic trigonometric functions, which are continuous over all real numbers? Which are not? What types of discontinuities are there?