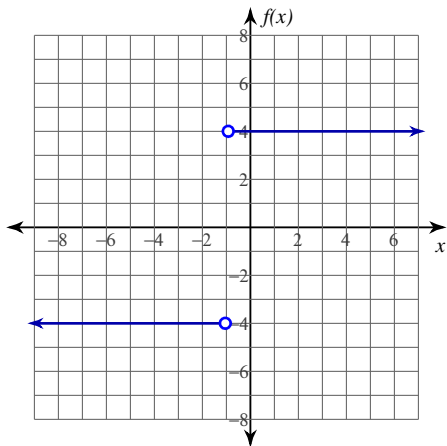


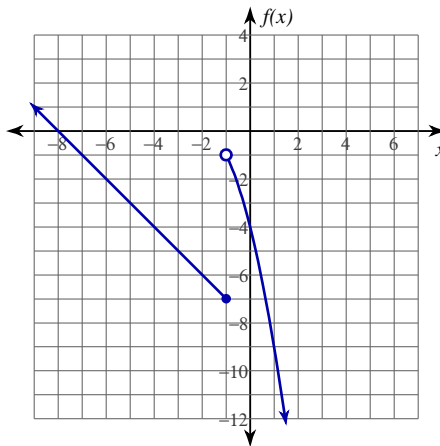
## Evaluating Limits

Evaluate each limit.

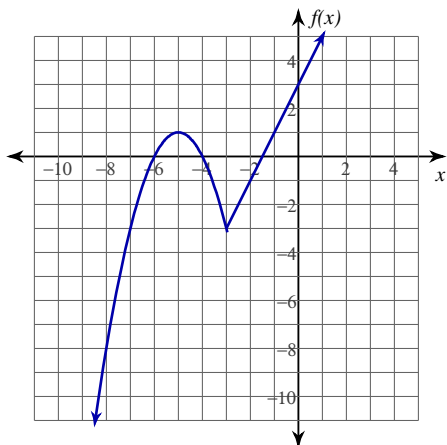
1)  $\lim_{x \rightarrow -1^+} \frac{4x + 4}{|x + 1|}$



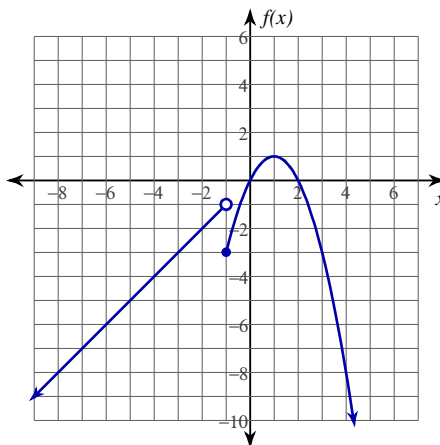
2)  $\lim_{x \rightarrow -1^-} f(x), f(x) = \begin{cases} -x - 8, & x \leq -1 \\ -x^2 - 4x - 4, & x > -1 \end{cases}$



3)  $\lim_{x \rightarrow -3} f(x), f(x) = \begin{cases} -x^2 - 10x - 24, & x \leq -3 \\ 2x + 3, & x > -3 \end{cases}$

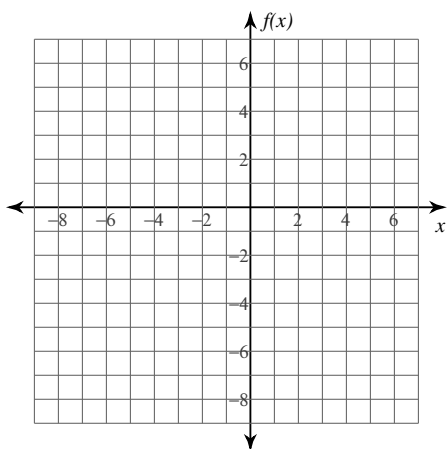


4)  $\lim_{x \rightarrow -1} f(x), f(x) = \begin{cases} x, & x < -1 \\ -x^2 + 2x, & x \geq -1 \end{cases}$

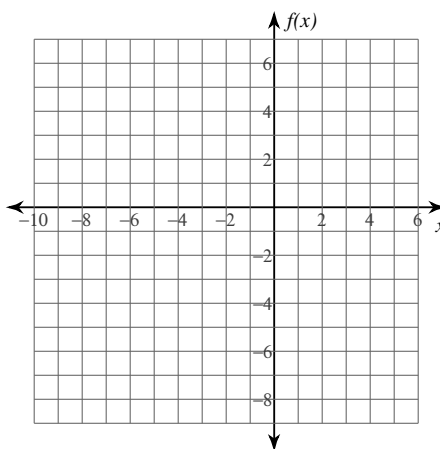


Evaluate each limit. You may use the provided graph to sketch the function.

$$5) \lim_{x \rightarrow -1^-} f(x), f(x) = \begin{cases} -x - 3, & x \leq -1 \\ x + 1, & x > -1 \end{cases}$$



$$6) \lim_{x \rightarrow -2} f(x), f(x) = \begin{cases} -x^2 - 4x - 5, & x \leq -2 \\ -1, & x > -2 \end{cases}$$



Evaluate each limit.

$$7) \lim_{x \rightarrow 0^+} f(x), f(x) = \begin{cases} 1, & x \leq 0 \\ -x^2 + 4x - 3, & x > 0 \end{cases}$$

$$8) \lim_{x \rightarrow 0^-} \frac{|x|}{x}$$

$$9) \lim_{x \rightarrow 0^+} \lfloor -2x + 1 \rfloor$$

$$10) \lim_{x \rightarrow 1} f(x), f(x) = \begin{cases} \frac{x}{2} + \frac{9}{2}, & x < 1 \\ x^2 - 6x + 10, & x \geq 1 \end{cases}$$

$$11) \lim_{x \rightarrow -1} \frac{3|x+1|}{x+1}$$

$$12) \lim_{x \rightarrow -2} f(x), f(x) = \begin{cases} x^2, & x \leq -2 \\ -\frac{x}{2} + 3, & x > -2 \end{cases}$$

Critical thinking questions:

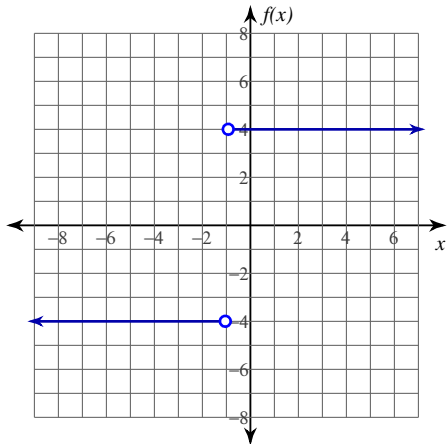
13) Give an example of a two-sided limit of a piecewise function where the limit does not exist.

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

# Evaluating Limits

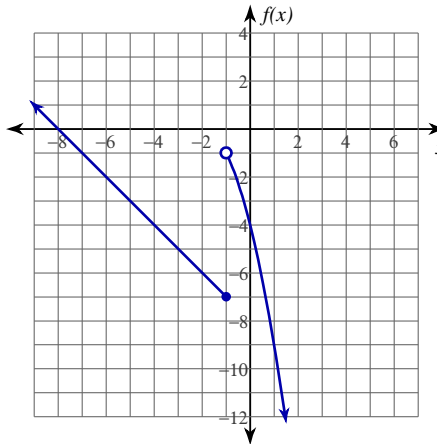
Evaluate each limit.

1)  $\lim_{x \rightarrow -1^+} \frac{4x + 4}{|x + 1|}$



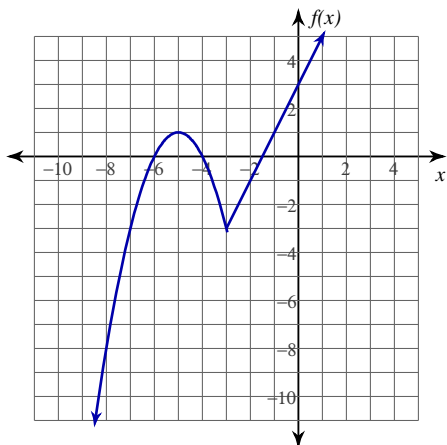
4

2)  $\lim_{x \rightarrow -1^-} f(x), f(x) = \begin{cases} -x - 8, & x \leq -1 \\ -x^2 - 4x - 4, & x > -1 \end{cases}$



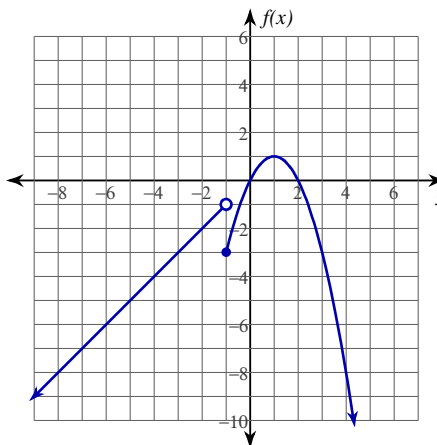
-7

3)  $\lim_{x \rightarrow -3} f(x), f(x) = \begin{cases} -x^2 - 10x - 24, & x \leq -3 \\ 2x + 3, & x > -3 \end{cases}$



-3

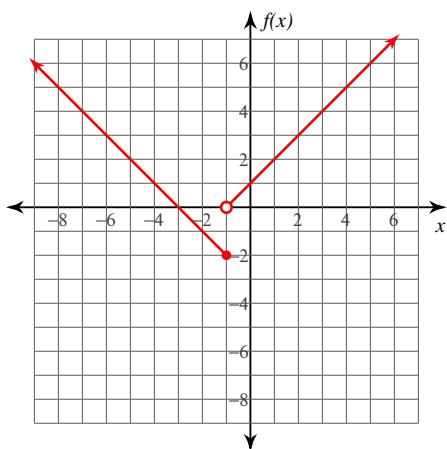
4)  $\lim_{x \rightarrow -1} f(x), f(x) = \begin{cases} x, & x < -1 \\ -x^2 + 2x, & x \geq -1 \end{cases}$



Does not exist.

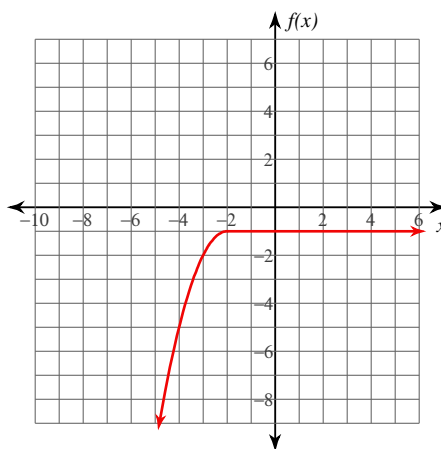
Evaluate each limit. You may use the provided graph to sketch the function.

$$5) \lim_{x \rightarrow -1^-} f(x), f(x) = \begin{cases} -x - 3, & x \leq -1 \\ x + 1, & x > -1 \end{cases}$$



-2

$$6) \lim_{x \rightarrow -2} f(x), f(x) = \begin{cases} -x^2 - 4x - 5, & x \leq -2 \\ -1, & x > -2 \end{cases}$$



-1

Evaluate each limit.

$$7) \lim_{x \rightarrow 0^+} f(x), f(x) = \begin{cases} 1, & x \leq 0 \\ -x^2 + 4x - 3, & x > 0 \end{cases}$$

-3

$$8) \lim_{x \rightarrow 0^-} \frac{|x|}{x}$$

-1

$$9) \lim_{x \rightarrow 0^+} [-2x + 1]$$

0

$$10) \lim_{x \rightarrow 1} f(x), f(x) = \begin{cases} \frac{x}{2} + \frac{9}{2}, & x < 1 \\ x^2 - 6x + 10, & x \geq 1 \end{cases}$$

5

$$11) \lim_{x \rightarrow -1} \frac{3|x+1|}{x+1}$$

Does not exist.

$$12) \lim_{x \rightarrow -2} f(x), f(x) = \begin{cases} x^2, & x \leq -2 \\ -\frac{x}{2} + 3, & x > -2 \end{cases}$$

4

Critical thinking questions:

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

Many answers. Ex:  $\lim_{x \rightarrow 1} f(x), f(x) = \begin{cases} 0, & x < 1 \\ x, & x \geq 1 \end{cases}$

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

Many answers. Ex:  $\lim_{x \rightarrow 0} \frac{|x|}{x}$