

Evaluating Limits

Evaluate each limit.

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

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

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

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

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

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

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

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

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

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

Critical thinking questions:

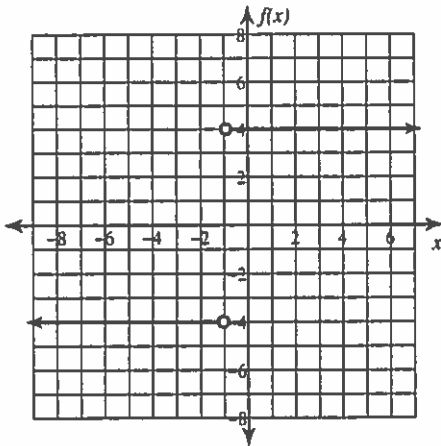
11) Give an example of a limit that evaluates to 4.

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

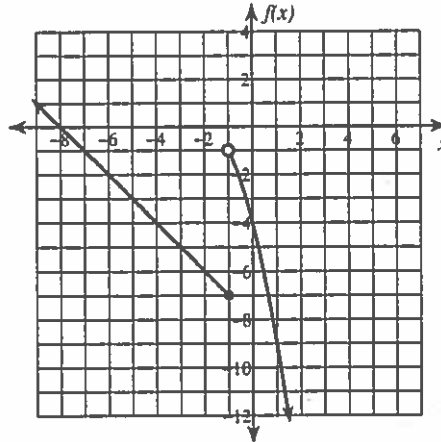
Evaluating Limits

Evaluate each limit.

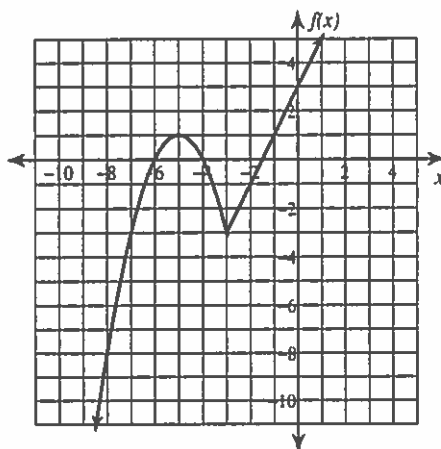
1) $\lim_{x \rightarrow -1^+} \frac{4x + 4}{|x + 1|}$



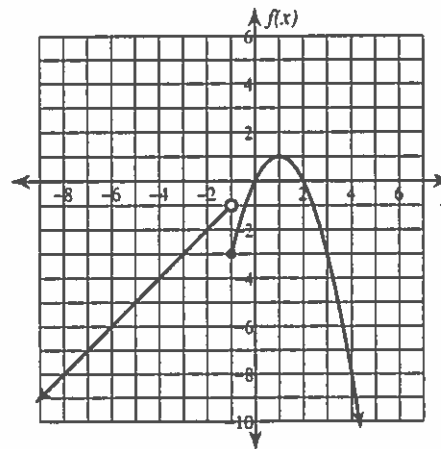
2) $\lim_{x \rightarrow -1^-} f(x), f(x) = \begin{cases} -x - 8, & x \leq -1 \\ -x^2 - 4x - 4, & x > -1 \end{cases}$



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

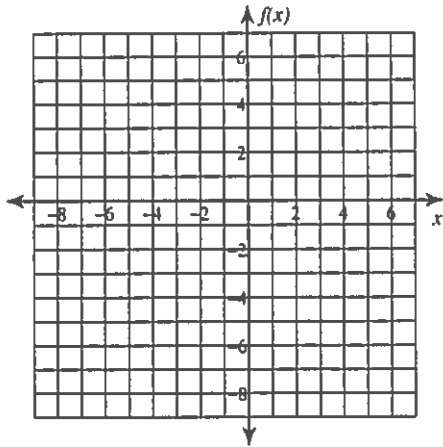


4) $\lim_{x \rightarrow -1} f(x), f(x) = \begin{cases} x, & x < -1 \\ -x^2 + 2x, & x \geq -1 \end{cases}$

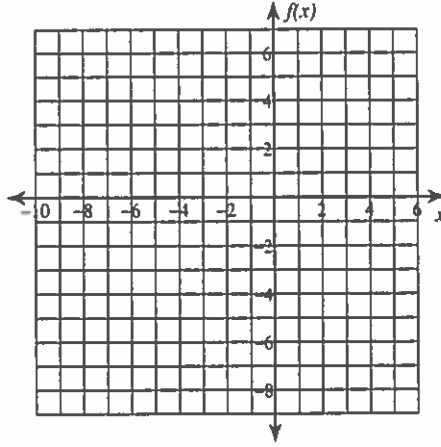


Evaluate each limit. You may use the provided graph to sketch the function.

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



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



Evaluate each limit.

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

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

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

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

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

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

Critical thinking questions:

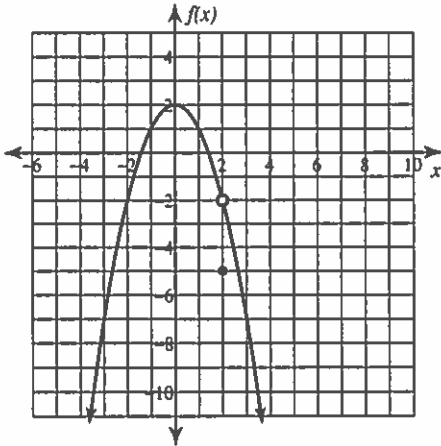
13) Give an example of a two-sided limit of a piecewise function where the limit does not exist.

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

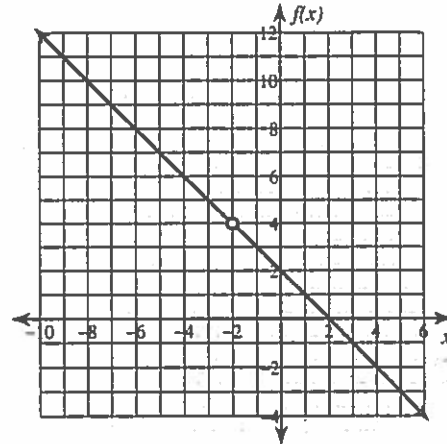
Evaluating Limits

Evaluate each limit.

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

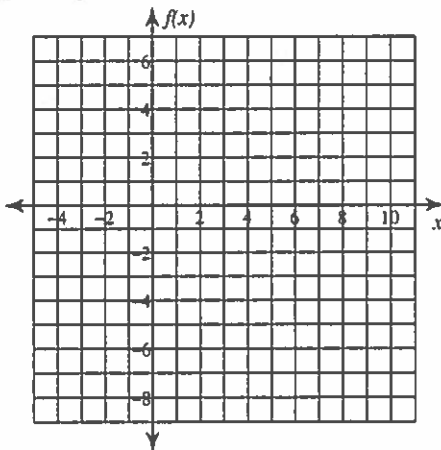


$$2) \lim_{x \rightarrow -2} -\frac{x^2 - 4}{x + 2}$$

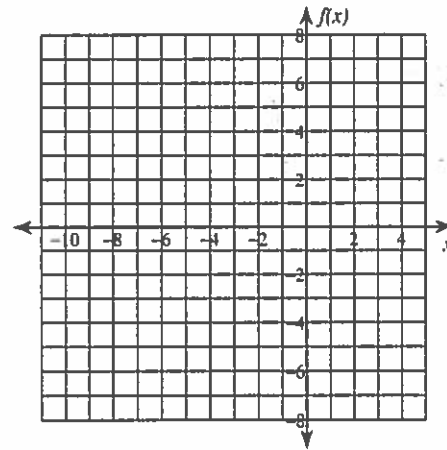


Evaluate each limit. You may use the provided graph to sketch the function.

$$3) \lim_{x \rightarrow 3} \frac{x^2 - 7x + 12}{x - 3}$$



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



Evaluate each limit.

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

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

$$7) \lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1}$$

$$8) \lim_{x \rightarrow 5} \frac{x^2 - 5x}{x - 5}$$

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

$$10) \lim_{x \rightarrow -5} \frac{x^2 + 3x - 10}{x + 5}$$

$$11) \lim_{x \rightarrow 0} \frac{\frac{1}{-4 + x} + \frac{1}{4}}{x}$$

$$12) \lim_{x \rightarrow -3} \frac{x}{\frac{1}{3 + x} - \frac{1}{3}}$$

$$13) \lim_{x \rightarrow 5} \frac{x - 5}{\sqrt{x + 4} - 3}$$

$$14) \lim_{x \rightarrow 3} \frac{\sqrt{x + 6} - 3}{x - 3}$$

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.

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