

Evaluating Limits at Infinity with Graphs

Use each equation and blank coordinate grid to sketch the function, then evaluate the specified limit exactly.

1. Evaluate as $x \rightarrow -\infty$.

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

Exact limit: _____

2. Evaluate as $x \rightarrow +\infty$.

$$f(x) = -1 + \frac{1}{2} \cdot (3)^{-x+1}$$

Exact limit: _____

3. Evaluate as $x \rightarrow +\infty$.

$$f(x) = 2 \cdot x - 1$$

Exact limit: _____

4. Evaluate as $x \rightarrow +\infty$.

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

Exact limit: _____

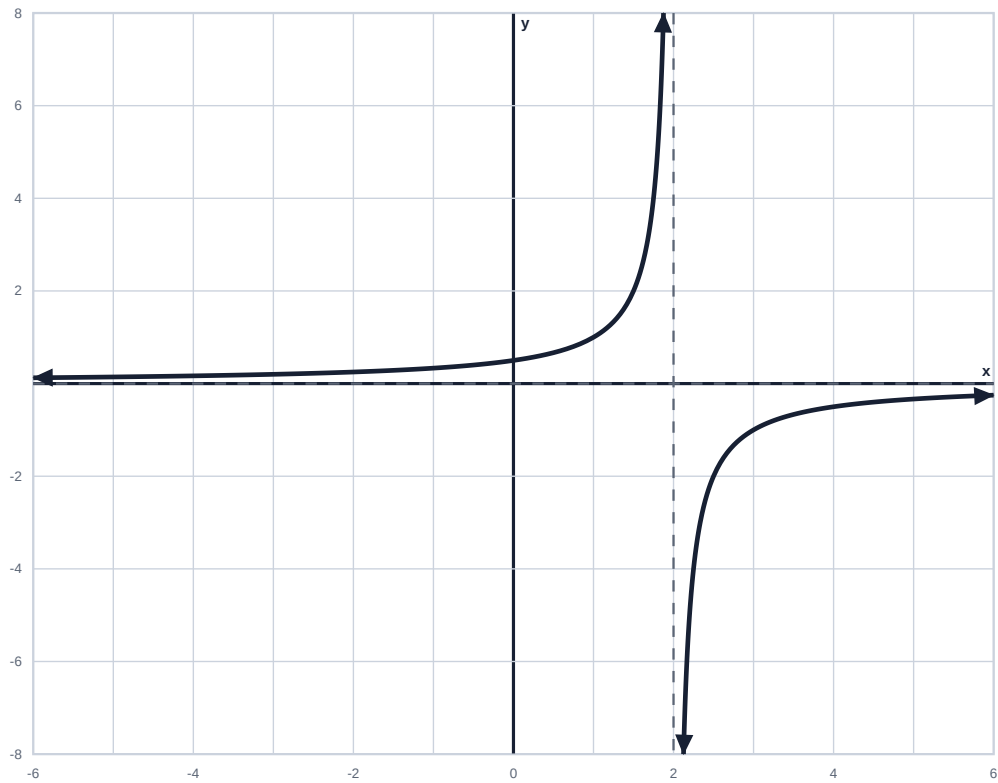
Evaluating Limits at Infinity with Graphs

Worked Answer Key

Use each equation and blank coordinate grid to sketch the function, then evaluate the specified limit exactly.

1. Completed graph; $x \rightarrow -\infty$

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



Real domain: $(-\infty, 2) \cup (2, +\infty)$. Exclusions: $x=2$ (pole).

Compare numerator and denominator degrees 0 and 1; the leading ratio is -1.

Exact limit as $x \rightarrow -\infty = 0$

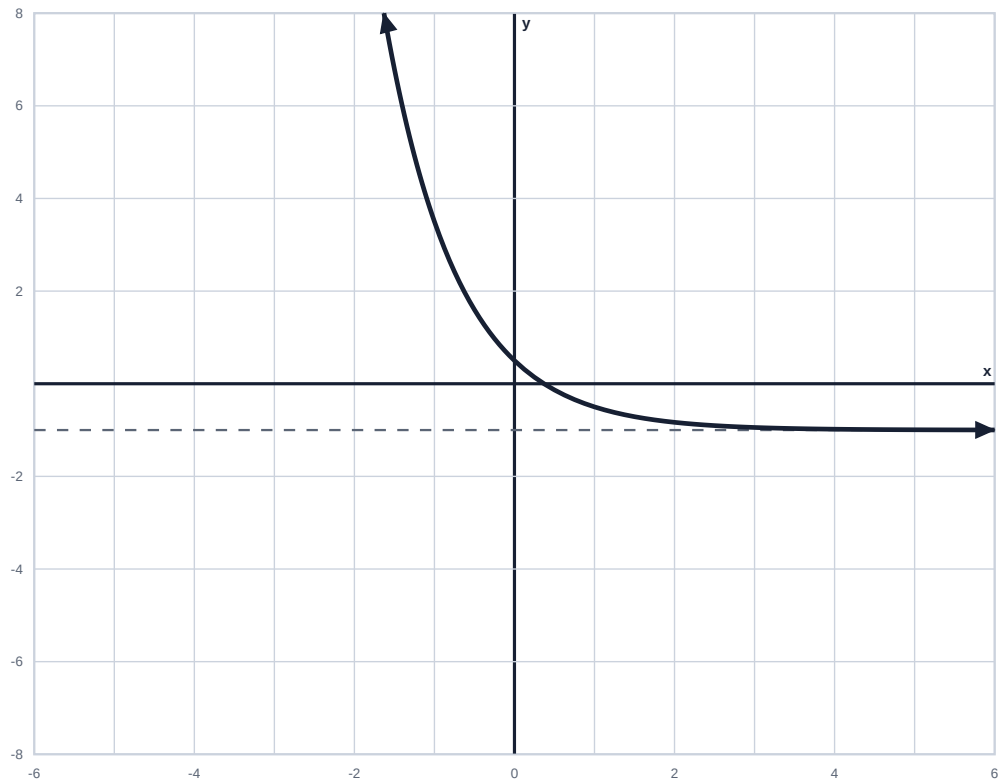
Evaluating Limits at Infinity with Graphs

Worked Answer Key

Use each equation and blank coordinate grid to sketch the function, then evaluate the specified limit exactly.

2. Completed graph; $x \rightarrow +\infty$

$$f(x) = -1 + \frac{1}{2} \cdot (3)^{-x+1}$$



Real domain: $(-\infty, +\infty)$.

The exponent rate makes the exponential tend to 0 on this tail.

Exact limit as $x \rightarrow +\infty$ = -1

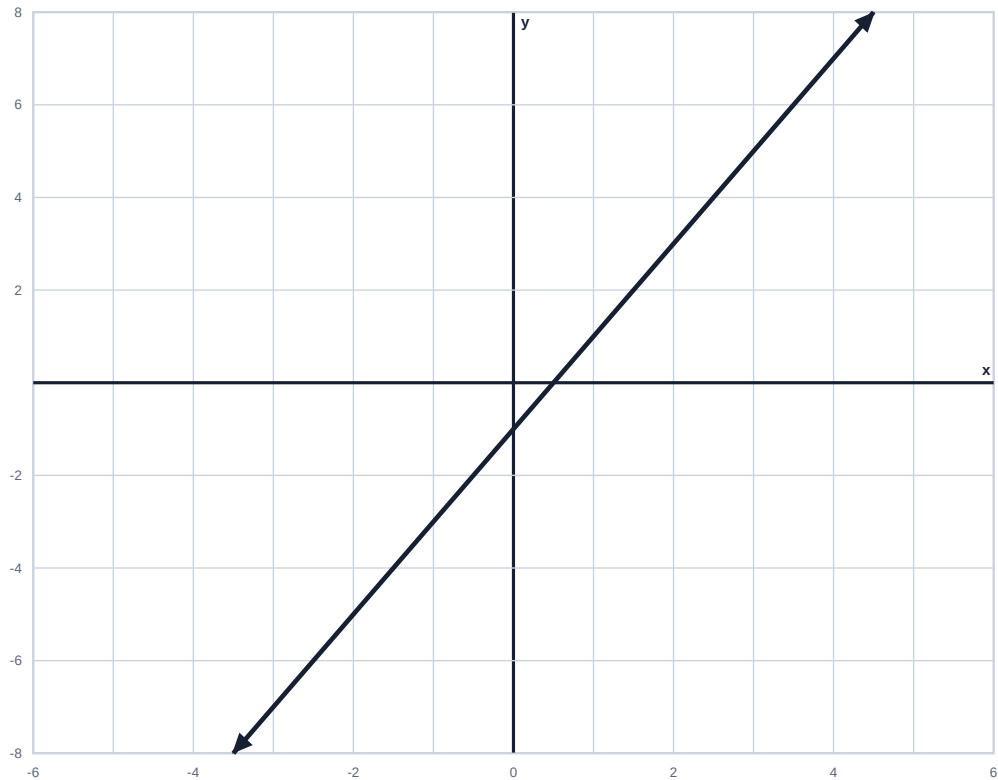
Evaluating Limits at Infinity with Graphs

Worked Answer Key

Use each equation and blank coordinate grid to sketch the function, then evaluate the specified limit exactly.

3. Completed graph; $x \rightarrow +\infty$

$$f(x) = 2 \cdot x - 1$$



Real domain: $(-\infty, +\infty)$.

The degree-1 leading term controls the tail, including the direction sign.

Exact limit as $x \rightarrow +\infty = +\infty$

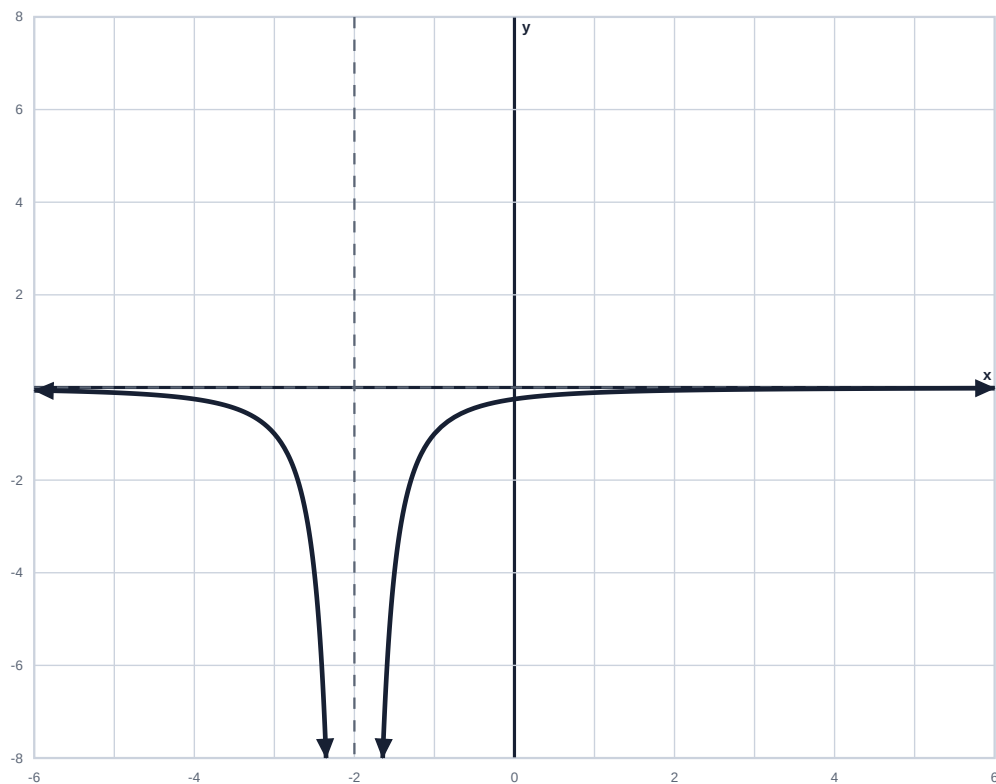
Evaluating Limits at Infinity with Graphs

Worked Answer Key

Use each equation and blank coordinate grid to sketch the function, then evaluate the specified limit exactly.

4. Completed graph; $x \rightarrow +\infty$

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



Real domain: $(-\infty, -2) \cup (-2, +\infty)$. Exclusions: $x = -2$ (pole).

Compare numerator and denominator degrees 0 and 2; the leading ratio is -1.

Exact limit as $x \rightarrow +\infty = 0$