Practice

Continuity and End Behavior

Determine whether each function is continuous at the given x-value. Justify your answer using the continuity test.

1. $y = \frac{2}{3x^2}; x = -1$

Yes; the function is defined at $x = -1$; y approaches $\frac{2}{3}$ as x approaches -1 from both sides; $f(-1) = \frac{2}{3}$.

2. $y = \frac{x^2 + x + 4}{2}; x = 1$

Yes; the function is defined at $x = 1$; y approaches 3 as x approaches 1 from both sides; $f(1) = 3$.

3. $y = x^3 - 2x + 2; x = 1$

Yes; the function is defined at $x = 1$; y approaches 1 as x approaches 1 from both sides; $f(1) = 1$.

4. $y = \frac{x - 2}{x + 4}; x = -4$

No; the function is undefined at $x = -4$.

Describe the end behavior of each function.

5. $y = 2x^5 - 4x$

$y \to \infty$ as $x \to \infty$,
$y \to -\infty$ as $x \to -\infty$

6. $y = -2x^6 + 4x^4 - 2x + 1$

$y \to -\infty$ as $x \to \infty$,
$y \to -\infty$ as $x \to -\infty$

7. $y = x^4 - 2x^3 + x$

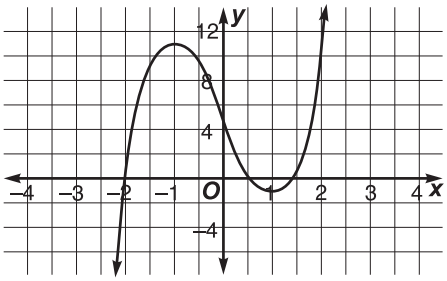
$y \to \infty$ as $x \to \infty$,
$y \to \infty$ as $x \to -\infty$

8. $y = -4x^3 + 5$

$y \to -\infty$ as $x \to \infty$,
$y \to \infty$ as $x \to -\infty$

Given the graph of the function, determine the interval(s) for which the function is increasing and the interval(s) for which the function is decreasing.

9.



increasing for $x < -1$ and $x > 1$;
decreasing for $-1 < x < 1$

10. ***Electronics*** Ohm's Law gives the relationship between resistance R, voltage E, and current I in a circuit as $R = \frac{E}{I}$. If the voltage remains constant but the current keeps increasing in the circuit, what happens to the resistance?

Resistance decreases and approaches zero.