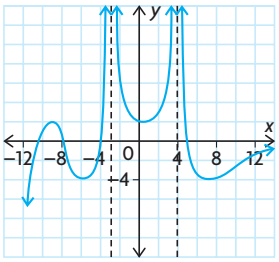
Chapter 4 Test



1. The graph of function $y = f(x)$ is shown at the left.
   a. Estimate the intervals where the function is increasing.
   b. Estimate the intervals where $f'(x) < 0$.
   c. Estimate the coordinates of the critical points.
   d. Estimate the equations of any vertical asymptotes.
   e. What is the value of $f''(x)$ on the interval $-4 < x < 4$?
   f. If $x \geq -6$, estimate the intervals where $f'(x) < 0$ and $f''(x) > 0$.
   g. Identify a point of inflection, and state the approximate ordered pair for the point.
2. a. Determine the critical points of the function $g(x) = 2x^4 - 8x^3 - x^2 + 6x$.
   b. Classify each critical point in part a.
3. Sketch the graph of a function with the following properties:
   - There are local extrema at $(-1, 7)$ and $(3, 2)$.
   - There is a point of inflection at $(1, 4)$.
   - The graph is concave down only when $x < 1$.
   - The x-intercept is -4, and the y-intercept is 6.
4. Check the function $g(x) = \dfrac{x^2 + 7x + 10}{(x - 3)(x + 2)}$ for discontinuities. Conduct appropriate tests to determine if asymptotes exist at the discontinuity values. State the equations of any asymptotes and the domain of $g(x)$.
5. Sketch a graph of a function f with all of the following properties:
   - The graph is increasing when $x < -2$ and when $-2 < x < 4$.
   - The graph is decreasing when $x > 4$.
   - $f'(-2) = 0, f'(4) = 0$
   - The graph is concave down when $x < -2$ and when $3 < x < 9$.
   - The graph is concave up when $-2 < x < 3$ and when $x > 9$.
6. Use at least five curve-sketching techniques to explain how to sketch the graph of the function $f(x) = \dfrac{2x + 10}{x^2 - 9}$. Sketch the graph on graph paper.
7. The function $f(x) = x^3 + bx^2 + c$ has a critical point at $(-2, 6)$.
   a. Find the constants b and c.
   b. Sketch the graph of $f(x)$ using only the critical points and the second derivative test.