# SECTION 2-4: CONTINUITY

Read Section 2.4. Work the embedded problems.

1. Pictures of graph discontinuities

2. Definition of continuity at a point

3. Sketch the graph of a function $f(x)$ with the following properties:

   (a) the domain of $f(x)$ is the interval $[0, 10]$.

   (b) $f(x)$ is continuous except at $x = 0$ where it has in infinite discontinuity and $x = 5$ where it has a jump discontinuity.

4. Give an example of a function that is continuous everywhere on its domain.

5. Determine the point(s), if any, at which each function is discontinuous. Justify your answer. Classify any discontinuity as jump, removable, infinite, or other.

   (a) $g(x) = x^{-1} + 1$

   (b) $h(x) = \frac{x+2}{x^2-4}$

6. Find the value(s) of k that makes the function continuous over the given interval.

$$f(x) = \begin{cases} e^{kx} & \text{if } 0 \leq x < 4 \\ 2x + 1 & \text{if } 4 \leq x \leq 10 \end{cases}$$

7. The Intermediate Value Theorem

BONUS:

8. Use the Intermediate Value Theorem to show that the equation $x^4 + x - 3 = 0$ must have a solution in the interval from $x = 1$ to $x = 2$.