1. Equations such as $A = 40x - x^2$ and $h = 300 - 16t^2$ define quadratic functions. The word function means that assigning a value to one of the variables (x or t) determines a unique value for the other (A or h). It is customary to say that "A is a function of x." In this example, however, it would be incorrect to say that "x is a function of A." Explain.

2. A hose used by the fire department shoots water out in a parabolic arc. Let x be the horizontal distance from the hose's nozzle, and y be the corresponding height of the stream of water, both in feet. The quadratic function is $y = -0.016x^2 + 0.5x + 4.5$.
    a. What is the significance of the 4.5 that appears in the equation?
    b. Find the stream's greatest height.
    c. What is the horizontal distance from the nozzle to where the stream hits the ground?
    d. Will the stream go over a 6-foot high fence that is located 28 feet from the nozzle?
    e. Sketch a graph of the function.

3. Sketch the graphs of $f(x) = (x - 4)^2$ and $g(x) = (4 - x)^2$. What do you notice about the graphs? Explain why this is true.

4. The three functions $y = 2(x - 4) - 1, y = 2|x - 4| - 1$ and $y = 2(x - 4)^2 - 1$ look somewhat similar. Predict what the graph of each will look like, and then sketch them by hand by plotting a few kay points. In each case, think about how the form of the equation can help provide information.

5. Determine the domain and range of $f(x) = \frac{x^2 - 1}{x + 1}$.

6. Determine the domain and range of $y = -2\sqrt{2x - 3} + 2$.

7. The IRS Tax Formula for married couples in the year 2013 is given by the linear-piecewise function below:

$$T(x) = \begin{cases} 0.1x & \text{for } 0 \le x \le 17850 \\ 1785 + 0.15(x - 17850) & \text{for } 17850 < x \le 72500 \\ 9982.5 + 0.25(x - 72500) & \text{for } 72500 < x \le 146400 \\ 28457.5 + 0.28(x - 146400) & \text{for } 146400 < x \le 223050 \\ 49919.5 + 0.33(x - 223050) & \text{for } 223050 < x \le 398350 \\ 107768.5 + 0.35(x - 398350) & \text{for } 398350 < x \le 450000 \\ 125846 + 0.396(x - 450000) & \text{for } 450000 < x \end{cases}$$

   a. What does x represent?
   b. What does T(x) represent?
   c. Determine the tax owed for a married couple whose income is $76,423 annually.
   d. Is this function continuous on the domain?

8. Given the graph of the function f(x). Sketch the inverse of the graph.

9. Find a function f for which f(x+3) is not equivalent to f(x) + f(3).

10. Find a function f for which f(x+3) is equivalent to f(x) + f(3).

11. What is the result of graphing the equation $(x - h)^2 + (y - k)^2 = r^2$? Where h, k and r are integers.

12. Write an equation that describes all the points on the circle whose center is at the origin and whose radius is (a) 13; (b) 6 and (c) r

13. Graph the circle whose equation is $x^2 + y^2 = 64$. What is its radius? What do the equations $x^2 + y^2 = 1, x^2 + y^2 = 40$ and $x^2 + y^2 = k$ all have in common? How do they differ?