Function Problems
Math 130 Kovitz

1. Find the domain and range of the function \( f(x) = \sqrt{x - 29} + 3 \).

2. Find the domain and range of the function \( f(x) = \sqrt{x + 1} + 1 \).
   Find the value of \( f \) when \( x = 0 \); and find all \( x \) (if any) for which \( f(x) = 0 \).
   Find all \( a \) for which \( f(a) = a \). Check all answers.

3. Is each relation a function? Why or why not?

4. The following is the entire graph of a function \( f \):

   \begin{align*}
   &\text{(a) Find } f(-3) \text{ and } f(0).
   
   &\text{(b) For which } a \text{ does } f(x) = a \text{ have more than one solution?}
   
   &\text{(c) Estimate } f(3.5)
   
   &\text{(d) Estimate the } x \text{ for which } f(x) = 2.75.
   
   &\text{(e) Mark on the graph the point or points where } y = 2.5 \text{ and } y = 2.2.
   
   &\text{(f) Find the domain and the range.}
   \end{align*}

5. For the given function \( f(x) = x^2 - 3x \), evaluate \( f(x + 1) \).

6. For the given function \( f(x) = x^2 - x \), evaluate \( f(x - 1) \).

7. For the given function \( H(x) = x^2 + 2x \), evaluate
   \begin{align*}
   &\text{(a) } H(x + 1).
   
   &\text{(b) } H(x) + H(1).
   \end{align*}

8. Let \( f \) be the function with the rule \( f(x) = x^2 - 11x + 1 \).
   \begin{align*}
   &\text{(a) Find } f(0), f(7), \text{ and } f(-2).
   
   &\text{(b) Find } \frac{f(3 + h) - f(3)}{h}, \text{ assuming that } h \neq 0.
   \end{align*}

   (This will be an expression for the slope of the secant line connecting the points on the graph for \( x = 3 \) and \( x = 3 + h \). It will also represent the average rate of change of the function from the point where \( x = 3 \) to the point where \( x = 3 + h \)).
9. In each part, sketch the graph by transforming the graph of \( x^2 + y^2 = 25 \), pictured here. The relation \( x^2 + y^2 = 25 \) is called the parent relation.

(a) \((x + 2)^2 + (y - 6)^2 = 25\)

(b) \((5x)^2 + (\frac{y}{5})^2 = 25\)

10. In each part, sketch the graph by transforming the graph of \( y = x^3 \), pictured here. The function \( y = x^3 \) is called the parent function.

(a) \(y = (x + 3)^3\)

(b) \(y + 8 = x^3\)

(c) \(y/11 = x^3\)

11. In each part, decide whether the function \( f \) with the given rule is even, odd, or neither.

(a) \( f(x) = 4x^6 \)

(b) \( f(x) = 3x^2 - 2x \)

(c) \( f(x) = \sqrt{x(x^2 + 6x^8)} \)

(d) \( f(x) = \frac{x^4 + 1}{x^3 - x} \)