1. Reread the definition of a relation on page 191. Draw graphs of the following relations, then state their domains and ranges, and finally decide if they determine functions.

a) \{(0, 0), (1, 1), (1, -1), (4, 2), (4, -2), (9, 3), (9, -3)\}.

b) \{(1, -1), (-1, -5), (2, 1), (3, 3), (0, -3)\}.

c) \{(4, 1), (5, 1), (6, 1)\}.
2. A more common way to define a function than to list ordered pairs is to give a rule $f$ which tells what the output $f(x)$ is for a given input $x$. For the functions below, evaluate the function values requested.

a) $f(x) = 3x - 5$. Find $f(-2), f(0), f(a), f(x + a), f(-x)$.

b) $g(x) = x^2 + 1$. Find $g(1), g(-2), g(a), g(x + a), g(-x)$.

c) $h(x) = \begin{cases} 
  x + 1 & x \geq 1 \\
  x - 2 & x < 1 
\end{cases}$. Find $h(2), h(1), h(-1)$.

3. Find the domains of the functions below.

a) $f(x) = 3x - 1$.

b) $f(x) = \frac{x + 1}{x - 2}$.

c) $h(x) = \sqrt{x - 1}$.

d) $g(x) = \sqrt{x + 1}$.

e) $h(x) = \frac{\sqrt{x + 2}}{x - 5}$.
4. Solve the following inequalities.

\[ a \quad -5(x - 1) > 4x - 13 \quad b \quad |3 - 4x| \geq 13 \]

\[ c \quad -2 < x + 1 \leq 5 \quad d \quad |x - 5| < 3 \]

5. A local bank charges $8 per month plus 5 cents per check. The credit union charges $2 per month plus 8 cents per check. How many checks per month can you write if the credit union is the better deal?

6. A company that manufactures graphing calculators has fixed costs of $65,000 per month. It costs the company $20 to manufacture each calculator. If the calculators sell for $85 each, how many calculators need to be sold each month in order to make a profit?
7. Solve the following inequalities.

a. \( x^2 + 2x - 15 \geq 0 \)

b. \( 2x^2 - 7x \leq -5 \)

c. \( \frac{1}{x + 1} > \frac{2}{x - 1} \)

d. \( |x^2 + 6x + 1| > 8 \)

8. A projectile is fired straight upward from the ground level with an initial velocity of 128 feet per second. During what interval of time will the projectile’s height exceed 128 feet? Use Newton’s model

\[
s = -16t^2 + v_0t + s_0
\]

where \( s \) is the position (in feet), \( t \) is the time (in seconds), \( v_0 \) is the initial velocity and \( s_0 \) is the initial position.

9. The average cost \( \bar{C} \) per unit of producing \( x \) units of a product is modelled by

\[
\bar{C} = \frac{150,000 + 0.25x}{x}
\]

How many units must be produced in order that the average cost per unit produced is does not exceed $1.75?