

1. Let  $P = (-1, 4)$  and  $Q = (6, -3)$  be two points in the coordinate plane.
  - (a) Plot  $P$  and  $Q$  on the coordinate plane.
  - (b) Find the distance between  $P$  and  $Q$ .
  - (c) Find the midpoint of the segment  $PQ$ .
  - (d) Find the slope of the line containing  $P$  and  $Q$ .
  - (e) Find the perpendicular bisector of the line containing  $P$  and  $Q$ .
  - (f) Find an equation for the circle for which the segment  $PQ$  is a diameter.

2. Find the center and radius of the circle given by the equation below

$$x^2 + 8x + y^2 - 6y - 9 = 0$$

3. Let  $L$  be the line given by  $8x - 4y = 24$ .
  - (a) Find the x- and y-intercepts of the graph of this line.
  - (b) Using the intercepts, graph the line.
  - (c) Write the equation of the line in slope-intercept form.
  - (d) What is the slope of the line?
  - (e) What is the slope of the line parallel to  $L$  that passes through the origin?
  - (f) What is the slope of the line perpendicular to  $L$  that passes through the origin?

4. Find an equation of a line with x-intercept  $\pi$  and y-intercept  $\sqrt{2}$
5. Suppose your grade  $g$  on an exam depends on the number of hours  $h$  you study for it according to the equation
- $$g = 5h + 50 \text{ where } 0 \leq h \leq 10.$$
- (a) What grade do you expect if you study for 8 hours?
- (b) What does the y-intercept represent?
- (c) What does the slope represent?
6. Suppose that  $A$  varies directly as  $z$  and that  $A = 100$  when  $z = 12$ .
- (a) Write an equation that expresses this variation.
- (b) What is the value of  $A$  when  $z = 17$ ?
7. Suppose that  $Y$  varies directly as  $x$  and inversely as  $w$  and that  $Y = 10$  when  $x = 12$  and  $w = 7$ .
- (a) Write an equation that expresses this variation.
- (b) What is the value of  $Y$  when  $x = 7$  and  $w = 10$ ?
8. Let  $f(x) = x^2 + \sqrt{x} - \frac{1}{x-1}$ .
- (a) Evaluate  $f(0)$  and  $f(2)$ .
- (b) What is the domain of  $f(x)$ ?
9. Let  $f(x) = \sqrt{x^2 - 16x}$
- (a) Determine the domain and range of  $f(x)$ .
- (b) Calculate the average rate of change of  $f(x)$  on the intervals  $[8, 9]$  and  $[10, 11]$ .
- (c) On which interval above is  $f(x)$  increasing the fastest?

10. A function  $f$  has the following verbal description: "multiply by 3, then subtract one".
- (a) Find a formula that expresses  $f$ .
- (b) Find the inverse function of  $f(x)$ .
11. Does  $f(x) = x^2$  have an inverse function? (If so what is it?) Does  $f(x) = x^3$  have an inverse function?

12. Find the inverse function of  $f(x) = \frac{x - 5}{8 - x}$ .

13. Find the inverse function and graph  $f(x)$  and  $f^{-1}(x)$  on the same axis.

(a)  $f(x) = \sqrt{4 - x}$  for  $0 \leq x \leq 4$

(b)  $f(x) = 2x + 1$

14. Let

$$f(x) = \begin{cases} 1 - x & \text{if } x < 1 \\ 3 & \text{if } x = 1 \\ 2x + 1 & \text{if } x > 1 \end{cases}$$

(a) Evaluate  $f(0)$ .

(b) Evaluate  $f(1)$ .

(c) Evaluate  $f(2)$ .

(d) Evaluate  $f(f(0))$ .

(e) Evaluate  $f(f(f(0)))$ .

15. If  $f(x) = x^2 + 1$  and  $g(x) = x - 3$  evaluate

(a)  $f \circ g =$  \_\_\_\_\_ (b)  $f(g(3)) =$  \_\_\_\_\_

(c)  $g \circ f =$  \_\_\_\_\_ (d)  $g(g(3)) =$  \_\_\_\_\_

(e)  $g \circ g \circ g =$  \_\_\_\_\_ (f)  $g(f(3)) =$  \_\_\_\_\_