

**EQUATIONS & INEQUALITIES**

1. Solve each of the following equations or inequalities.

(a)  $x^2 + 3x > 4$

(b)  $\frac{1}{6} < \frac{2x - 3}{12} \leq \frac{2}{3}$

(c)  $|4 - 2x| \geq 4$

$$(d) \left| \frac{2x - 1}{x + 1} \right| = 3$$

$$(e) 1 - 5x > 5 - 3x$$

$$(f) x < \frac{2}{x - 1}$$

$$(g) |5x + 1| < 16$$

## ANALYTIC GEOMETRY

2. Write the equation of the circle whose center is  $(-7, 2)$  and that is tangent to the  $y$ -axis.

3. Find the center and radius of the circle whose equation is

$$x^2 - 6x + y^2 + 14y = -8.$$

4. Which of the points  $(1, 6)$  and  $(7, 4)$  is closer to  $(3, 2)$ ?

5. Find the distance between the points of the intersection of the graphs of  $y = x^2 - 3$  and  $y = x + 3$ .

6. The endpoints of a diameter of a circle are  $(2, -7)$  and  $(-10, -2)$ .

(a) Find the equation of this circle.

(b) What is the area of this circle?

(c) List four other points on this circle.

(d) Does the point  $(1, -12)$  lie on this circle? What about the point  $(8, \frac{1}{2})$ ?

## FUNCTIONS

7. Let  $f(x) = 2x^2 - 7x + 11$ . Find and simplify each of the following.

(a)  $f(-3)$

(b)  $f\left(-\frac{3}{7}\right)$

(c)  $f(x^2)$

(d)  $f(x+3) - f(x-3)$

(e)  $f(-x)$

(f)  $f\left(\frac{1}{x}\right)$

(g) the difference quotient of  $f$ .

8. (a) Find all intercepts of  $f(x) = \frac{2x + 5}{x^2 - 9}$ .

(b) Find the domain of  $f(x) = \frac{2x + 5}{x^2 - 9}$ .

(c) Find the domain of  $g(x) = \sqrt{\frac{2x + 5}{x^2 - 9}}$ .

9. Let  $f(x) = x^3 - 3x^2 - 28x$ .

(a) Find the domain of  $f$ .

(b) Determine all intervals where  $f(x) < 0$ .

(c) Determine all intervals where  $f(x) > 0$ .

(d) Determine all intervals where  $f(x) \leq 0$ .

(e) Determine all intervals where  $f(x) \geq 0$ .

10. Let  $f(x) = 2x^4 - 3x^3 - 6x^2 + 7x - 10$ . Find and simplify

(a)  $\frac{f(x) - f(-x)}{2}$ .

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

11. Let  $g(x) = \frac{x - 1}{x + 1}$ .

(a) Find and simplify  $g(x^2 + 1)$ .

(b) Find all values of  $x$  for which  $g(x) = 2$ .

(c) Find and simplify  $g\left(\frac{x}{x+1}\right)$ .

(d) the difference quotient of  $g$ .