

## Chapter 3 Prerequisite Skills

BLM 3-1

**Reciprocal Functions**

1. Explain how the *asymptotes* of  $f(x) = \frac{1}{x}$  relate to restrictions on the domain and range of  $f$ .
2. For each reciprocal function, write equations for the vertical and horizontal asymptotes. Use transformations to sketch the graph of each function relative to the graph of the base function

$$f(x) = \frac{1}{x}.$$

$$\text{a) } f(x) = \frac{1}{x+2}$$

$$\text{b) } f(x) = -\frac{1}{x-1}$$

$$\text{c) } f(x) = \frac{1}{3x-12}$$

**Domain and Range**

3. Write the domain and range for each function.
  - a)  $f(x) = x^2 - 4$
  - b)  $f(x) = 3x + 4$
  - c)  $f(x) = -\sqrt{x+3} - 5$
  - d)  $f(x) = -\frac{3}{x+2}$

**Slope**

4. Calculate the slope of the line that passes through the points in each pair. Express your answer as an integer or a fraction in lowest terms.
  - a)  $(-2, 5)$  and  $(1, 3)$
  - b)  $(4, -3)$  and  $(7, 3)$
  - c)  $(0, -3)$  and  $(-2, 0)$
  - d)  $(-2.3, 5)$  and  $(1.2, 2)$
  - e)  $(4.3, 2.7)$  and  $(2.6, -3.3)$

5. Calculate the slope of the line that passes through the points in each pair. Express your answer as a decimal, rounded to two decimal places, when necessary.
  - a)  $(4, -3)$  and  $(2, -4)$
  - b)  $(-3, -1)$  and  $(6, -3)$
  - c)  $(1.5, 2.6)$  and  $(3.2, -1.2)$
  - d)  $(1.63, -3.43)$  and  $(-4.15, 3.11)$

**Factoring Polynomials**

6. Factor fully for  $x \in \mathbb{R}$ .
  - a)  $x^2 + 3x - 4$
  - b)  $6x^2 - 7x - 3$
  - c)  $12x^2 + x - 6$
  - d)  $4x^3 - 7x^2 - 14x - 3$
  - e)  $8x^3 + 125$

**Solving Quadratic Equations**

7. Determine the roots of each quadratic equation.
  - a)  $x^2 + 2x - 35 = 0$
  - b)  $3x^2 - 11x - 4 = 0$
  - c)  $6x^2 - 11x + 4 = 0$
  - d)  $12x^2 + 31x + 20 = 0$
8. Determine the  $x$ -intercepts, if any exist. Express your answers in exact form.
  - a)  $y = x^2 + 2x - 5$
  - b)  $y = x^2 - 4x + 1$
  - c)  $y = 2x^2 + x - 7$
  - d)  $y = -x^2 + 3x - 5$

**Solving Inequalities**

9. Solve each inequality. Show your answers on a number line.
  - a)  $x^2 < 16$
  - b)  $x^2 - 2x - 15 \geq 0$
  - c)  $2x^2 + 7 \leq 10$
  - d)  $3x^2 - x - 3 \geq 2x^2 - 6x + 3$
  - e)  $3x^2 + 6x \geq 2x^2 + x - 3$
  - f)  $2x^2 + 33 \geq 16x$