

**2.1 Functions and Equivalent Algebraic Expressions****BLM 2-3**

1. Simplify each expression and state all restrictions on  $x$ .

a)  $\frac{x-3}{x^2-x-6}$

b)  $\frac{x+5}{x^2+9x+20}$

c)  $\frac{x^2+3x-4}{x^2+7x+12}$

d)  $\frac{x^2-9}{x^2-8x+15}$

2. Evaluate each expression for the  $x$ -values of  $-3$ ,  $0$ ,  $1$ , and  $5$ . Are all values possible in each expression? Explain.

a)  $(3x-1)(x+4) - (x+5)(x-1)$

b)  $\frac{2}{x^2-2x-15}$

c)  $\frac{x^2+2x-3}{x^2-x-6}$

3. A rectangular picture is to have an area of  $600 \text{ cm}^2$ .
- Express the length in terms of the width.
  - Express the perimeter in terms of width.
  - What are the restrictions on the width in the perimeter function?

4. Determine whether  $h(x)$  is the simplified form of  $g(x)$ . If it is the simplified form, state any restrictions on  $h(x)$ . If it is not, then determine the proper simplified form, with the restrictions on  $h(x)$ .

a)  $g(x) = \frac{3x^2-5x-2}{x^2-x-2}$ ,  $h(x) = \frac{3x+1}{x+1}$

b)  $g(x) = \frac{6x^2+5x-4}{6x^2+11x-2}$ ,  $h(x) = \frac{3x+4}{3x-4}$

c)  $g(x) = \frac{x^2-1}{x^2+1}$ ,  $h(x) = -1$

d)  $g(x) = \frac{6x^2-13x+6}{2x^2+7x-15}$ ,  $h(x) = \frac{3x-2}{x+5}$

5. What would the graph of the function

$$f(x) = \frac{x^2+x-2}{x+2}$$
 look like? Justify

your answer.

6. A square of side length  $x$  cm has a square of side length  $5$  cm cut out of it.

a) Express the area of the remaining square as a function of the side length of the larger square.

b) State the domain and range of the area function.

7. A container manufacturer makes several sizes of containers for use on cargo ships. The length of the container is always  $10$  m more than the width of the container, and the height of the container is always double the width.

a) Write expressions for the length, width, and height of the container design as a function of  $x$ .

b) Express the volume of the container in terms of the variable  $x$ .

c) What are the restrictions on the variable?

d) Find the dimensions of the container for  $x = 8$  and  $x = 15$ .

e) Determine the volume of the container for the values of  $x$  in part d).

