

Math 95 HW 11 (6.2) Multiplication and Division of Rational Expressions

Name: \_\_\_\_\_

**Review of Fractions:**

11.  $\frac{1}{2} \cdot \frac{4}{5}$

15.  $\frac{3}{8} \cdot 2$

19.  $\frac{5}{7} \div \frac{15}{14}$

13.  $\frac{7}{8} \cdot \frac{4}{3} \cdot (-3)$

17.  $-\frac{7}{11} \div 14$

21.  $6 \div \left(-\frac{1}{3}\right)$

**Simplifying Rational Expressions:**

In exercises 23 - 51, simplify the rational expression. State any domain restriction necessary so that the expressions truly are equivalent.

23.  $\frac{5x}{x^2}$

29.  $\frac{(x-1)(x+1)}{x-1}$

25.  $\frac{3z+6}{z+2}$

31.  $\frac{x^2-4}{x+2}$

$$35. \frac{(3x+1)(x+2)}{(x+2)(5x-2)}$$

$$47. -\frac{4-t}{t-4}$$

$$39. \frac{x^2+2x}{x^2+3x+2}$$

$$51. \frac{5-y}{y-5}$$

In exercises 61 - 103, multiply or divide as appropriate. Leave your answer in factored form when appropriate. State any domain restriction necessary so that the expressions truly are equivalent.

$$61. \frac{2}{x} \cdot \frac{x-1}{3x}$$

$$63. \frac{x-2}{x} \cdot \frac{x-3}{x+4}$$

$$65. \frac{1}{2x} \cdot \frac{4x}{2}$$

$$73. \frac{x+1}{x} \cdot \frac{x}{x+2}$$

$$67. \frac{5a}{4} \cdot \frac{12}{5a}$$

$$75. \frac{b^2+1}{b^2-1} \cdot \frac{b-1}{b+1}$$

$$69. \frac{9x^2y^4}{8xy^6} \cdot \frac{(2xy^2)^3}{3(xy)^4}$$

$$79. \frac{3n-9}{n^2-9} \cdot \frac{n^3+27}{12}$$

$$83. \frac{x-1}{y} \cdot \frac{y(x+y)}{2} \cdot \frac{y}{x+y}$$

$$95. \frac{x+5}{x-x^3} \div \frac{25-x^2}{x^3}$$

$$87. \frac{8a^4}{3b} \div \frac{a^5}{9b^2}$$

$$99. \frac{x^2-4}{x^2+x-2} \div \frac{x-2}{x-1}$$

$$91. \frac{6b}{b+2} \div \frac{3b^4}{2b+4}$$

$$103. \frac{x-3}{x-1} \div \frac{x^2}{x-1} \div \frac{x-3}{x}$$

## Applications:

109. The average cost per item in dollars for a company to produce  $x$  digital cameras is given by

$$C(x) = \frac{50x + 20,000}{x}.$$

- a. The company expects to sell 5000 cameras. Determine what the expected average cost per item will be. Use function notation appropriately in your process.
- b. Write an expression  $T(x)$  that gives the total cost of producing  $x$  cameras. Simplify the expression.
- c. Supposing again that the company expects to sell 5000 cameras, determine the expected total cost for producing all 5000 cameras. Use function notation appropriately in your process.

111. The area of a certain rectangle is given by  $A(x) = 5x^2 + 12x + 4$  and its width is given by  $W(x) = x + 2$ .

- a. Determine a simplified function  $L(x)$  which outputs the length of the rectangle.
- b. Use the function  $L$  you found in part (a) to determine the length of the rectangle if the width is 8 feet. [Hint: If the width is 8 feet, what is  $x$ ?]

### Supplemental Problems:

S1. Simplify the expressions for the following rational functions. State any domain restriction necessary so that the expression truly are equivalent.

$$(a) f(x) = \frac{2x^2 + 6x}{3x + 9}$$

$$(d) L(x) = \frac{x^3 - 4x^2 - 5x}{2x^2 - 13x + 15}$$

$$(b) T(x) = \frac{x^2 + 6x + 9}{x^2 - 9}$$

$$(e) d(x) = \frac{x^2 - 16}{12 - 3x}$$

$$(c) g(x) = \frac{2x^2 - x - 6}{x^2 + x - 6}$$

$$(f) A(x) = \frac{12x^2 - 23x + 10}{12x^2 - 23x + 10}$$

## Solutions to Supplemental Problems:

S1.

a.  $f(x) = \frac{2x}{3}$ , provided  $x \neq -3$

d.  $L(x) = \frac{x(x+1)}{2x-3}$ , provided  $x \neq 5$

b.  $T(x) = \frac{x+3}{x-3}$ , provided  $x \neq -3$

e.  $d(x) = -\frac{x+4}{3}$ , provided  $x \neq 4$

c.  $g(x) = \frac{2x+3}{x+3}$ , provided  $x \neq 2$

f.  $A(x) = 1$ , provided  $x \neq \frac{5}{4}$  and  $x \neq \frac{2}{3}$