

1. Simplify each of the following rational expressions.

$$(a) \frac{100x^3y^5}{36xy^8} = \frac{25x^2}{9y^3}$$

$$(c) \frac{-3m^4n}{12m^4n^3} = \frac{-1}{4n^2}$$

$$(b) \frac{48ab^3c^2}{6a^7bc^0} = \frac{8b^2c^2}{a^6}$$

$$(d) \frac{12r^9s^3}{24r^8s^4} = \frac{r}{2s}$$

2. Find the domain of each of the following rational functions. (Remember that dividing by 0 is undefined. Find any value of x that makes the denominator of the function 0; those values of x are *not* in the domain.)

$$(a) f(x) = \frac{1}{x-2} \quad x \neq 2$$

$$(c) f(x) = \frac{x}{x^2-4} \quad x \neq 2 \text{ or } -2$$

$$(b) f(x) = \frac{3x-1}{2x-5} \quad x \neq 5/2$$

$$(d) f(x) = \frac{x}{x^2-4} \quad x \neq 2 \text{ or } -2$$

3. Factor the following polynomials.

$$(a) x^2 - 4 = (x+2)(x-2)$$

$$(d) x^2 + x - 2 = (x-1)(x+2)$$

$$(b) x^2 + 6x + 9 = (x+3)(x+3)$$

$$(e) x^2 + 2x - 3 = (x-1)(x+3)$$

$$(c) x^2 + x - 6 = (x-2)(x+3)$$

4. Use your answers from Question 3 to simplify the following rational expressions.

$$(a) \frac{(x^2+6x+9)(x^2-4)}{(x^2+x-2)(x^2+x-6)}$$

$$= \frac{\cancel{(x+3)}(x+3)\cancel{(x+2)}(x-2)}{\cancel{(x+2)}(x-1)\cancel{(x+3)}(x-2)} = \frac{x+3}{x-1}$$

$$(b) \frac{(x^2+x-6)(x^2+2x-3)}{(x^2+x-2)(x^2+6x+9)}$$

$$= \frac{\cancel{(x+3)}(x-2)\cancel{(x+3)}(x-1)}{(x+2)\cancel{(x-1)}\cancel{(x+3)}(x+3)} = \frac{x-2}{x+2}$$

5. State the domain of each of the following rational functions, and simplify.

$$(a) f(x) = \frac{x-5}{x^2-25} \quad \text{Domain: } x \neq 5 \text{ or } -5$$

$$(b) f(x) = \frac{x(x-3)^5}{x^3(x-3)^2} \quad \text{Domain: } x \neq 0 \text{ or } x \neq 3$$

$$(c) f(y) = \frac{y^2+8y-9}{y^2-5y+4} \quad \text{Domain: } y \neq 4 \text{ or } y \neq 1$$

$$y^2-5y+4 = (y-4)(y-1)$$

$$(d) f(x) = \frac{x+5}{-x-5} \quad \text{Domain: } x \neq -5$$

$$(e) f(y) = \frac{y-14}{14-y} \quad \text{Domain: } y \neq 14$$