

Factor, then simplify.

$$1) \frac{3n}{n+3} \cdot \frac{7n^2+21n}{7n}$$

$$3n$$

$$2) \frac{7(k-7)}{8k} \div \frac{(k-7)(k+4)}{8k(k+4)}$$

$$7$$

$$3) \frac{1}{4x^2} \div \frac{x-5}{x^2+x-30}$$

$$\frac{x+6}{4x^2}$$

$$4) \frac{1}{6r+30} \div \frac{r-5}{r^2-13r+40}$$

$$\frac{r-8}{6(r+5)}$$

$$5) \frac{5b^2-25b}{b-5} \cdot \frac{1}{5b}$$

$$1$$

$$6) \frac{r^2+6r-40}{3r+30} \cdot \frac{6r-18}{r^2-7r+12}$$

$$2$$

$$7) \frac{\frac{16}{x^2}}{\frac{12}{x} + \frac{x^2}{9}} \quad \frac{144}{108x+x^4}$$

$$8) \frac{\frac{x+1}{4}}{\frac{x+1}{16} + \frac{4}{x+1}}$$

$$\frac{4x^2+8x+4}{x^2+2x+65}$$

Identify the domain and range of each.

$$9) y = \frac{3}{4}\sqrt{x+4} - 3$$

Domain: $x \geq -4$ Range: $y \geq -3$ **Find the quotient (the answer when you divide) of the following expression using synthetic division (or box division or long division).**

$$10) (r^3 + 4r^2 - 52r + 35) \div (r - 5)$$

$$r^2 + 9r - 7$$

An "excluded value" is the value of the variable that, when substituted into the expression, causes division by zero (which is not allowed). a) Simplify the following expressions
b) state what the "excluded values" are for each

$$11) \frac{90}{50x - 30}$$

$$\frac{9}{5x - 3}; \left\{ \frac{3}{5} \right\}$$

$$12) \frac{20r - 10}{20}$$

$$\frac{2r - 1}{2}; \text{ No excluded values.}$$

- 13) (a) write the intercept form equation
(b) find the x-intercepts.

$$y = 7x^3 - 12x^2 - 4x$$

$$y = x(x - 2)(7x + 2), x = 0, 2, -\frac{2}{7}$$

- 14) (a) write the intercept form equation
(b) find the x-intercepts.

$$f(x) = 4x^3 - x^2 - 4x + 1$$

$$a) y = (x^2 - 1)(4x - 1)$$

$$b) x = -1, 1, \frac{1}{4}$$

Simplify each expression.

$$15) \frac{m + 5n}{10m^6} - \frac{m - 3n}{10m^6}$$

$$\frac{4n}{5m^6}$$

$$16) \frac{5y}{4x} + \frac{6}{2xy^2}$$

$$\frac{5y^3 + 12}{4xy^2}$$

$$17) \frac{4}{a + 4} - \frac{4}{a - 1}$$

$$-\frac{20}{(a - 1)(a + 4)}$$

$$18) \frac{4}{5x + 1} - \frac{4x}{5x - 1}$$

$$\frac{16x - 4 - 20x^2}{(5x - 1)(5x + 1)}$$

$$19) \frac{x + 5}{2(x - 5)} - \frac{5}{2x}$$

$$\frac{x^2 + 25}{2x(x - 5)}$$

$$20) \frac{6x}{3x + 6} + \frac{3}{x - 5}$$

$$\frac{2x^2 - 7x + 6}{(x - 5)(x + 2)}$$

Simplify each and state the excluded values.

$$21) \frac{x^3 + 3x^2 - 40x}{2x^3 - 18x^2 + 40x}$$
$$\frac{x + 8}{2(x - 4)}; \{0, 5, 4\}$$

$$22) \frac{7x^4 + 42x^3 + 56x^2}{x^2 + 10x + 24}$$
$$\frac{7x^2(x + 2)}{x + 6}; \{-6, -4\}$$

Write the slope-intercept form of the equation of the line through the given points.

23) through: $(-2, -5)$ and $(1, 1)$

$$y = 2x - 1$$

24) through: $(-1, 6)$ and $(3, -4)$ $y = -\frac{5}{2}x + \frac{17}{2}$

Simplify.

25) $\sqrt{6}(3\sqrt{2} + 4\sqrt{3})$

$$6\sqrt{3} + 12\sqrt{2}$$

26) $-2\sqrt{10}(3\sqrt{6} + 5\sqrt{2})$

$$-12\sqrt{15} - 20\sqrt{5}$$

Solve each equation. Remember to check for extraneous solutions.

27) $\frac{x - 4}{x} - 5 = \frac{x - 3}{x}$

$$\left\{ -\frac{1}{5} \right\}$$

28) $\frac{1}{5n^2} + \frac{n + 4}{5n^2} = \frac{n + 6}{n^2}$ $\left\{ -\frac{25}{4} \right\}$

29) $\frac{1}{5} + \frac{n - 4}{n^2} = \frac{n - 3}{5n}$ $\left\{ \frac{5}{2} \right\}$

30) $\frac{x - 2}{x} + \frac{3}{x} = \frac{3x + 3}{x^2}$

$$\{-1, 3\}$$