

1. Simplify.

$$\frac{3x^3 - 30x^2 - 72x}{6x^5 - 102x^4 + 360x^3} \div \frac{x^3 + 7x^2 - 4x - 28}{9x^4 + 18x^3 - 315x^2}$$

2. Solve.

$$\frac{3x}{x-2} - \frac{x-44}{x^2-11x+18} = \frac{2x}{x-9}$$

3. Simplify.

$$\frac{\frac{5}{x^2+3x-28}}{\frac{6}{x^2-x-12} - \frac{4}{x^2+10x+21}}$$

4. Solve.

$$\frac{x}{x^2+6x-16} = \frac{1}{x^2+x-6}$$

1. Simplify.

$$\frac{3x^3 - 30x^2 - 72x}{6x^5 - 102x^4 + 360x^3} \div \frac{x^3 + 7x^2 - 4x - 28}{9x^4 + 18x^3 - 315x^2}$$

$$3x(x^2 - 10x - 24)$$

$$3x(x-12)(x+2)$$

$$6x^3(x^2 - 17x + 60)$$

$$6x^3(x-5)(x-12)$$

$$9x^2(x^2 + 2x - 35)$$

$$9x^2(x+7)(x-5)$$

|    |                |                  |
|----|----------------|------------------|
|    | x              | +7               |
| x  | x <sup>3</sup> | +7x <sup>2</sup> |
| -4 | -4x            | -28              |

$$(x+7)(x+2)(x-2)$$

$$= \frac{3x(x-12)(x+2)}{6x^3(x-5)(x-12)} \cdot \frac{9x^2(x+7)(x-5)}{(x+7)(x+2)(x-2)}$$

$$= \frac{9}{2(x-2)}$$

2. Solve.

$$\frac{3x}{x-2} - \frac{x-44}{x^2 - 11x + 18} = \frac{2x}{x-9}$$

$$\frac{(x-9)}{(x-9)} \cdot \frac{3x}{x-2} - \frac{x-44}{(x-9)(x-2)} = \frac{2x}{x-9} \cdot \frac{(x-2)}{(x-2)}$$

$$3x(x-9) - (x-44) = 2x(x-2)$$

$$3x^2 - 27x - x + 44 = 2x^2 - 4x$$

$$3x^2 - 28x + 44 = 2x^2 - 4x$$

$$-2x^2 + 4x$$

$$x^2 - 24x + 44 = 0$$

$$(x-2)(x-22) = 0$$

$$x = \cancel{2}, 22$$

$$x = 22$$

3. Simplify.

$$\frac{5}{x^2 + 3x - 28} \rightarrow \frac{(x+7)(x-4)}{(x+7)(x-4)}$$

$$\frac{6}{x^2 - x - 12} - \frac{4}{x^2 + 10x + 21} \rightarrow \frac{(x-4)(x+3)}{(x-4)(x+3)} - \frac{4}{(x+7)(x+3)}$$

$$\frac{5}{(x+7)(x-4)} \cdot \frac{(x+7)(x-4)(x+3)}{(x+7)(x-4)(x+3)}$$

$$\frac{6}{(x-4)(x+3)} - \frac{4}{(x+7)(x+3)}$$

$$= \frac{5(x+3)}{6(x+7) - 4(x-4)}$$

$$= \frac{5(x+3)}{6x+42-4x+16}$$

$$= \frac{5(x+3)}{2x+58}$$

4. Solve.

$$\frac{x}{x^2 + 6x - 16} = \frac{1}{x^2 + x - 6}$$

$$(x+8)(x-2) \quad (x+3)(x-2)$$

$$\frac{(x+3)}{(x+3)} \cdot \frac{x}{(x+8)(x-2)} = \frac{1}{(x+3)(x-2)} \cdot \frac{(x+8)}{(x+8)}$$

$$x(x+3) = 1(x+8)$$

$$x^2 + 3x = x + 8$$

$$-x-8 \quad -x-8$$

$$x^2 + 2x - 8 = 0$$

$$(x+4)(x-2) = 0$$

$$x = -4, \cancel{2}$$

$$x = -4$$