

1) Consider $y = \frac{x^2 + 3x + 4}{x^2 - 7x + 12} \dots$

a) Evaluate the expression at $x = 0$

b) Determine the values where the rational expression is undefined.

2) Perform the indicated operations and simplify as needed. You may leave parts *a* and *b* in factored form. For part *d*, simplify only the numerator:

a) $\frac{x^2 + 2x - 15}{2x^2 - 5x - 3} \times \frac{x^2 - 10x + 25}{x^2 - 25}$

b) $\frac{x^2 + 4x - 12}{10x - 20} \div \frac{x^2 - 36}{x^3 - 216}$

c) $\frac{x^2 + 6x - 12}{x^2 + 19} - \frac{x^2 - 4x + 1}{x^2 + 19}$

d) $\frac{x - 5}{x + 1} + \frac{x - 6}{x - 2}$

3) Simplify the complex fractions:

a)
$$\frac{\frac{1}{x} + \frac{1}{x+2}}{2 + \frac{4}{x}}$$

b)
$$\frac{ab^{-2} + 4}{ab^{-3} + 1}$$

4) (5 points each) Solve for the variable in each equation:

a)
$$\frac{8}{x+2} + \frac{9}{x-4} = \frac{3}{x^2 - 2x - 8}$$

b)
$$\frac{x}{x+2} + \frac{5}{2x+1} = \frac{10}{x+2}$$

5) Solve for m in the equation $\frac{5a}{m+1} = \frac{6}{m+1} + 2$:

6) You and your siblings hold the most-awesome Math party of the year at your parents' home and end up making a mess in the process. Your parents, who you thought were away on vacation, are coming home in 5 hours. From experience, you know that you can clean the house in 9 hours, your brother can do the job in 10 hours and your sister can do the job in 8 hours. If you work together, will you be able to clean the house before your parents get home? Be sure to show all necessary work to solve the problem.

7) After spending the night over Psyche's house, Cupid gets up and goes for a morning jog. He can jog at a rate of 3 miles per hour (the wings are heavy.) Psyche wakes up 1 hour later and begins running on the same path Cupid took. She can run at a rate of 5 miles per hour. How long after Psyche awoke did she catch up to Cupid? Hint: let x represent Psyche's time for running.

8) It has been found that the number of pounds a goldfish weighs is directly proportional to the square root of volume of the aquarium the goldfish lives in. When the volume of the aquarium is 16 cubic feet, the goldfish weighs 3 pounds.

a) Name and define variables for this situation:

b) How much will the goldfish weigh if the tank is 25 cubic feet?