You must show work in order to receive credit.

1. List all numbers for which each expression is undefined.
   a) \( \frac{x - 2}{x^2 - 9} \)
   b) \( \frac{3x + 1}{x^2 + 1} \)
   c) \( \frac{x^2 - 2x - 8}{x^2 + 4x - 21} \)

2. Simplify. \( \frac{6x^2 + 7x - 5}{3x^2 - 13x - 30} \)

3. Multiply or divide, and simplify if possible.
   a) \( \frac{y^2 - 49}{12y} \cdot \frac{8y}{7 - y} \)
   b) \( \frac{2m^2 - 8m - 42}{m - 3} + \frac{2m^2 - 14m}{m^2 - 3m} \)
   c) \( \frac{36x^2 - 1}{5x^2 + 4x} + \frac{6x^2 - 17x - 3}{5x^2 - x - 4} \)
   d) \( \left( x^2 + 8x + 16 \right) + \frac{(x - 4)^2}{x^2 - 16} \)

4. Find the LCM: \( y^2 - 25, y^2 + 2y - 15, y^2 + 8y + 15 \)

5. Add or subtract, and simplify if possible.
   a) \( \frac{x + 1}{x + 2} - \frac{x^2 + 1}{x^2 - x - 6} \)
   b) \( \frac{8}{t - 3} + \frac{5}{t} \)
   c) \( \frac{y + 1}{y^2 - 4} - \frac{1}{4 - y^2} \)
   d) \( \frac{x - 6}{x - 2} - \frac{x - 5}{2 - x} \)
   e) \( \frac{5}{x^2 - 16} - \frac{x + 3}{x^2 + 3x - 4} \)
   f) \( \frac{2}{x + 2} + \frac{5}{x^2 - 4} - \frac{3}{x^2 + 4x + 4} \)

7. Simplify: a) \( \frac{4 - \frac{1}{x^2}}{2 - \frac{1}{x}} \)
   b) \( \frac{3}{ab^3} - \frac{a^2b^2}{ab^4} + \frac{5}{a^3b} \)

8. Solve
   a) \( \frac{12}{y} - \frac{12}{y - 1} = -1 \)
   b) \( \frac{5}{x^2 - x - 2} - \frac{1}{x + 1} = \frac{3}{x - 2} \)

9. Rosita can wax her car in 2 hours. When she works together with Helga, they can wax the car in 45 min. How long would it take Helga, working by herself, to wax the car?

10. Maria drives 21 km per hour faster than B.J. In the same time that B.J. drives 369 km, Maria drives 463.5 km. Find the speed of each car.

11. A naturalist at a state park studies the number of raccoons in a section of the park. He catches, tags and releases 30 raccoons. A month later, 16 raccoons are caught: 2 of them are tagged. Estimate the raccoon population in that section of the park.

12. Find the missing side if the two triangles are similar.