Handout 4  
Problems - Rational Equations  
Hand in Problems - due Tuesday, Nov. 3 - 2 points each

Remember: Solutions must be checked since multiplying both sides of an equation by an expression involving the variable may introduce extra solutions.

Problem. 5. Solve \( \frac{3}{x^2 - 6x + 9} + \frac{x - 2}{3x - 9} = \frac{x}{2x - 6} \).

Partial Solution: We begin by factoring the three denominators:

\[
\begin{align*}
x^2 - 6x + 9 &= (x - 3)(x - 3) \\
3x - 9 &= 3(x - 3) \\
2x - 6 &= 2(x - 3)
\end{align*}
\]

The LCD is \(2 \cdot 3(x - 3)^2\) and we multiply both sides by the LCD:

\[
2 \cdot 3(x - 3)^2 \left[ \frac{3}{(x - 3)^2} + \frac{x - 2}{3(x - 3)} \right] = 2 \cdot 3(x - 3)^2 \left[ \frac{x}{2(x - 3)} \right]
\]

This should eliminate the fractions.

\[\square\]

Problem. 6 The Ypsilanti Recreation Park swimming pool can be filled in 12 hr if water enters through a pipe alone or in 30 hours if water enters through a hose alone. If water is entering through both the pipe and the hose, how long will it take to fill the pool?

Partial Solution: Let \(t\) be the time required to fill the pool if water is entering through both the pipe and the hose. We saw that the equation to solve to find \(t\) is \(\frac{1}{12} + \frac{1}{30} = \frac{1}{t}\).

Problem. 7 It takes Valerie 48 minutes longer to wax the family car than it takes Gretchen. When the work together, they can wax the car in 45 minutes. How long would it take Gretchen, working by herself, to wax the car?

Partial Solution: Let \(t\) be the time Gretchen would take working by herself. Then the time Valerie would take working by herself is \(t + 48\). (We’re using minutes as our time units.) So Gretchen can do a fraction \(\frac{1}{t}\) of the job in one minute, Valerie can do \(\frac{1}{t+48}\) of the job in one minute and working together they can do \(\frac{1}{45}\) of the job in one minute. So \(\frac{1}{t} + \frac{1}{t+48} = \frac{1}{45}\).

\[\square\]