

Direction: Write neatly; show your work in an organized fashion.

1. Reduce:  $\frac{6x^2 + 17x + 7}{2x^2 + 7x + 3}$

2. Divide:  $\frac{25y^2 - 1}{9y^2 - 6y} \div \frac{5y^2 + 9y - 2}{3y^2 + y - 2}$

3. Add:  $\frac{x}{x^2 + 11x + 30} + \frac{-5}{x^2 + 9x + 20}$

4. Simplify:  $\frac{9 - \frac{1}{y^2}}{3 - \frac{1}{y}}$

5. Solve:  $\frac{7}{y} - \frac{1}{3} = \frac{1}{4}$

1. Reduce:  $\frac{6x^2 + 17x + 7}{2x^2 + 7x + 3} = \frac{(3x + 7)(2x + 1)}{(x + 3)(2x + 1)} = \frac{(3x + 7)}{(x + 3)}$

2. Divide:  $\frac{25y^2 - 1}{9y^2 - 6y} \div \frac{5y^2 + 9y - 2}{3y^2 + y - 2} = \frac{25y^2 - 1}{9y^2 - 6y} \cdot \frac{3y^2 + y - 2}{5y^2 + 9y - 2} = \frac{(5y + 1)(5y - 1)}{3y(3y - 2)} \cdot \frac{(3y - 2)(y + 1)}{(5y - 1)(y + 2)}$   
 $= \frac{(5y + 1)(y + 1)}{3y(y + 2)}$

3. Add:  $\frac{x}{x^2 + 11x + 30} + \frac{-5}{x^2 + 9x + 20} = \frac{x}{(x + 5)(x + 6)} + \frac{-5}{(x + 4)(x + 5)}$ , [ so LCD = (x+4)(x+5)(x+6) ]  
 $= \frac{(x + 4)x}{(x + 4)(x + 5)(x + 6)} + \frac{-5(x + 6)}{(x + 4)(x + 5)(x + 6)} = \frac{x^2 + 4x}{(x + 4)(x + 5)(x + 6)} + \frac{-5x - 30}{(x + 4)(x + 5)(x + 6)} = \frac{x^2 + 4x - 5x - 30}{(x + 4)(x + 5)(x + 6)}$   
 $= \frac{x^2 - x - 30}{(x + 4)(x + 5)(x + 6)} = \frac{(x + 5)(x - 6)}{(x + 4)(x + 5)(x + 6)} = \frac{(x - 6)}{(x + 4)(x + 6)}$

Multiply by a "fancy" one

4. Simplify:  $\frac{9 - \frac{1}{y^2}}{3 - \frac{1}{y}} = \frac{\left(9 - \frac{1}{y^2}\right) \left(\frac{y^2}{y^2}\right)}{\left(3 - \frac{1}{y}\right) \left(\frac{y^2}{y^2}\right)} = \frac{9y^2 - \frac{y^2}{y^2}}{3y^2 - \frac{y^2}{y}} = \frac{9y^2 - 1}{3y^2 - y} = \frac{(3y + 1)(3y - 1)}{y(3y - 1)} = \frac{(3y + 1)}{y}$

Multiply by "fancy" one and distribute  $y^2$  to all four terms

5. Solve:  $\frac{7}{y} - \frac{1}{3} = \frac{1}{4}$ . The LCM is 12y, so multiply every term by 12y.  
 $\frac{12y \cdot 7}{y} - \frac{12y \cdot 1}{3} = \frac{12y \cdot 1}{4} \rightarrow 12 \cdot 7 - 4y \cdot 1 = 3y \cdot 1 \rightarrow 84 - 4y = 3y$   
 $\left. \begin{matrix} 84 = 7y \\ +4y +4y \end{matrix} \right\} \frac{84}{7} = \frac{7y}{7} \left. \right\} y = 12$