HN PCFU: Adding and Subtracting Rational Expressions (E6/E7) Name:________________________

Solutions and explanations for the progress check:

1. $\frac{6x-1}{6x}+\frac{x-3}{3x^2} = \frac{x(6x-1)}{x(6x)}+\frac{2(x-3)}{2(3x^2)} = \frac{6x^2-x+2x-6}{6x^2} = \frac{6x^2+x-6}{6x^2}$

The expressions in this problem did not have a common denominator, so I knew that was the first thing I needed to find. The first thing I had to do was to figure out the smallest common denominator that 6x and $3x^2$ could both go into. Both denominators go evenly into $6x^2$, so I knew that was the LCD. Given that the LCD = $6x^2$, I needed to find new equivalent expressions with this denominator, so I multiplied the first fraction by $\frac{x}{x}$ and I multiplied the second fraction by $\frac{2}{2}$ so that the new fractions ended up with the LCD. Then I distributed as necessary and added the numerators together by combining like terms. To check to see if I could reduce this, I had to try to factor the numerator. I could not find any factors using a GCF or the diamond method that would work, so I knew this answer was as reduced as possible.

Restrictions: $x \neq 0$ → I determined my restrictions by figuring out what would make the denominator equal to zero. Since we cannot divide by zero, our restrictions are at those x-values. I did this by setting the LCD equal to zero and solving for x.

$$6x^2 = 0$$
$$x^2 = 0$$
$$x = 0$$

2. $\frac{2x^2-6x}{x-3}-\frac{2x+8}{2} = \frac{2(2x^2-6x)}{2(x-3)}-\frac{(x-3)(2x+8)}{(x-3)(2)} = \frac{(4x^2-12x)-(2x^2+2x-24)}{2(x-3)} = \frac{2x^2-14x+24}{2(x-3)} = \frac{\cancel{2(x-3)}(x-4)}{\cancel{2(x-3)}} = x-4$

Method 1: This problem did not have a common denominator. Since neither denominator is factorable, we can simply multiply the existing denominators together to get the LCD.
Given the LCD = 2(x-3), I needed to find new equivalent expressions with this denominator. So I multiplied the first fraction by $\frac{2}{2}$ and I multiplied the second fraction by $\frac{(x-3)}{(x-3)}$ so that the new fractions ended up with the LCD. Then I distributed as necessary and added the numerators together by combining like terms. To check to see if I could reduce this, I had to try to factor the numerator. Using both a GCF and the diamond method, I was able to factor the numerator and use the factors to simplify my final answer.

Restrictions: $x \neq 3$ → I determined my restrictions by figuring out what would make the denominator equal to zero. Since we cannot divide by zero, our restrictions are at those x-values. I did this by setting the factor with a variable in the LCD equal to zero and solving for x. I knew I didn't need to set 2 equal to zero because 2 can never equal zero.

$$x-3 = 0$$
$$x = 3$$

Method 2: I noticed that this problem had a bit of a short-cut that made it easier. Both original fractions can be factored and simplified already using a GCF… $\frac{2x\cancel{(x-3)}}{\cancel{(x-3)}}-\frac{\cancel{2}(x+4)}{\cancel{2}}$ = 2x – (x+4) = 2x – x – 4 = x – 4

Restrictions: $x \neq 3$ → I determined my restrictions by figuring out what would make the denominators equal to zero **<u>BEFORE</u>** I simplified. Since we cannot divide by zero, our restrictions are at those x-values. I did this by setting the denominator with the variable equal to zero and solving for x. I knew I didn't need to set 2 equal to zero because 2 can never equal zero.

$$x-3 = 0$$
$$x = 3$$

Additional Practice:

1. Find the least common denominator for each pair of denominators.

   a) $3x$ and $3x - 5$

   b) $6x$ and $3x^2$

   c) $x - 5$ and $x^2 - 25$

2. Rewrite each fraction with the new denominator indicated.

a) $\frac{4x}{3} = \frac{\quad}{3(x+1)}$

b) $\frac{(x-2)}{5x} = \frac{\quad}{5x^2}$

c) $\frac{x+3}{x} = \frac{\quad}{x(x-1)}$

3. Combine these expressions by filling in the missing parts. Simplify if possible.

a) $\frac{7}{x-2} + \frac{5x}{x+1} = \frac{\quad}{(x-2)(x+1)} + \frac{\quad}{(x-2)(x+1)} = \frac{\quad}{(x-2)(x+1)}$

b) $\frac{x+4}{x} - \frac{2x}{x-3} = \frac{\quad}{x(x-3)} - \frac{\quad}{x(x-3)} = \frac{\quad}{x(x-3)}$

c) $\frac{6x}{x+2} + \frac{4}{x-2} = \underline{\qquad\qquad} + \underline{\qquad\qquad} = \underline{\qquad\qquad} = \underline{\qquad\qquad}$