Class Practice on Complex Fractions

1. Simplify: \( \frac{\frac{2}{5} \div \frac{3}{7}}{\frac{1}{x} + 2} \)

2. Simplify: \( \frac{\frac{x}{1 - 2}}{\frac{1}{x}} \)
3. Simplify: \( \frac{a + \frac{3}{b}}{b - 2a} \)

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

   Method 1: Multiply numerator and denominator by the least common denominator (the LCM) of all the fractions present within the complex fraction.
   
   \[
   \frac{2}{\frac{3}{5}} = \frac{2 \cdot \frac{5}{7}}{\frac{3 \cdot 7}{5}} = \frac{2 \cdot 7}{5 \cdot 3} = \frac{14}{15} \quad \text{Answer}
   \]

   Method 2: Since there is a single fraction in the numerator and also a single fraction in the denominator we can invert the denominator and multiply.
   
   \[
   \frac{2}{\frac{3}{5}} = \frac{2 \cdot \frac{5}{7}}{\frac{3}{5}} = \frac{14}{15} \quad \text{Answer}
   \]

2. Simplify: \( \frac{1}{x^{2}} + \frac{1}{x} - \frac{1}{x} \)

   Method 1: Multiply numerator and denominator by the least common denominator (the LCM) of all the fractions present within the complex fraction.
   
   \[
   \frac{1}{x^{2}} + \frac{1}{x} - \frac{1}{x} = \left( \frac{1}{x} + 2 \right) \cdot x = 1 + 2x \quad \text{Answer}
   \]

   Method 2: There is not just one fraction in the numerator nor is there just one fraction in the denominator. So first we will simplify the numerator and then we will simplify the denominator. Then we will invert and multiply.
   
   \[
   \frac{1}{x^{2}} + \frac{1}{x} - \frac{1}{x} = \left( \frac{1}{x} + 2 \right) \cdot \frac{x}{x} = \frac{1 + 2x}{x} \cdot \frac{x}{1 - 2x} = \frac{1 + 2x}{1 - 2x} \quad \text{Answer}
   \]
3. Simplify: \[ \frac{a+\frac{3}{b}}{b-2a} \]

We will use method 1 on this example.

\[ \frac{a+\frac{3}{b}}{b-2a} = \frac{\left(a+\frac{3}{b}\right)\cdot b}{(b-2a)\cdot b} = \frac{ab+3}{b^2-2ab} \leftarrow \text{Answer} \]

4. Simplify: \[ \frac{1}{x-1} - \frac{2}{5} \]

\[ 1 + \frac{5}{x-1} \]

We will use method 1 on this example.

\[ \frac{1}{x-1} - \frac{2}{5} = \frac{\left(\frac{1}{x-1} - \frac{2}{5}\right)\cdot x(x-1)}{1 + \frac{5}{x-1}\cdot x(x-1)} = \frac{x-2(x-1)}{x(x-1)+5x} = \frac{x-2x+2}{x^2-x+5x} = \frac{-x+2}{x^2+4x} \leftarrow \text{Answer} \]