Simplify Complex Fractions

Problem: Simplify $\dfrac{2+\frac{2}{x}}{4-\frac{4}{x}}$

Key Information: Complex fractions have fractions either within their numerator, denominator or both the numerator and denomina. It might also be useful to think of complex fractions as a fraction(s) within a fraction.

Solution: We can use the following steps to simplify complex fractions:

1) Simplify the numerator and/or denominator using the LCD.

   The LCD of 2 and $\frac{2}{x}$ will be x, which gives us $\frac{2x}{x}+\frac{2}{x}=\frac{2x+2}{x}$ in the numerator.

   The LCD of 4 and $\frac{4}{x}$ will also be x, which gives us $\frac{4x}{x}-\frac{4}{x}=\frac{4x-4}{x}$ in the denominator.

$$\frac{\frac{2x+2}{x}}{\frac{4x-4}{x}}$$

2) Multiply the numerator by the reciprocal of the denominator (KEEP the numerator, CHANGE the sign to multiplication, FLIP the fraction in the denominator).

$$\frac{2x+2}{x} * \frac{x}{4x-4}$$

3) Factor and/or simplify further if possible.

$$\frac{2(x+1)}{x} * \frac{x}{4(x-1)} = \frac{1}{2}$$