Complex Fractions

Summary

1. Complex fractions are fractions within fractions.
2. Our goal is to have at most 1 fraction bar in our expression.
3. We can simplify it by methods previously discussed or multiplying every term by the least common tiny denominator (LCTD).

Complex Fraction

A **complex fraction** is a rational expression which contains other rational expressions in the numerator and/or denominator.

Some examples of complex fractions are given below:

$$\frac{\frac{2}{x}-3}{\frac{5}{x}+\frac{7}{x}} \quad \text{and} \quad \frac{\frac{x}{x+1}+\frac{7}{x}}{\frac{3}{2x}+\frac{8}{x-4}}$$

- Goal is to get **at most** one fraction bar.
- Clear out "tiny" fractions by multiplying everything by the **least common tiny denominator**, or **LCTD**.
- LCTD is the least common denominator of all of the "tiny" fractions.
- We then simplify 😎

How to find the Least Common (Tiny) Denominators

- To find the LCTD of numbers, find the least common multiple of those numbers.
- To find the LCTD of variable terms, select the highest power of each term.

Example 1. Simplify each completely.

(a) $\dfrac{3+\frac{1}{x}}{\frac{2}{x}+4}$

(b) $\dfrac{\frac{x+4}{3}+\frac{1}{x}}{1+\frac{1}{x}}$

(c) $\dfrac{\frac{x+4}{5}-\frac{1}{x}}{1-\frac{25}{x^2}}$

(d) $\dfrac{\frac{3}{x^2}-\frac{1}{3}}{\frac{x+2}{15}-\frac{1}{x}}$

(e) $\dfrac{\frac{25}{x}-x}{\frac{x-8}{15}+\frac{1}{x}}$