4-4 COMPLEX FRACTIONS

Complex fractions are simply defined as fractions that have other fractions within their numerators and/or denominators. To simplify these fractions means to remove these minor fractions and then eliminate any common factors. The key, as always, is to multiply by the number one in ways that simplify the fraction.

***Exercise* #1:** Consider the complex fraction $\dfrac{\frac{1}{9}+\frac{1}{18}}{\frac{1}{3}}$.

(a) What is the least common denominator amongst the three minor fractions?

(b) Multiply the numerator and denominator of the major fraction by your answer in part (a) and then simplify your result.

(c) Why is it acceptable to perform the operation in part (b)? What number are you effectively multiplying by?

By multiplying the major fraction by the number one, by using the least common denominator, we will always eliminate the minor fractions (by turning them into integer expressions).

***Exercise* #2:** Simplify each of the following complex fractions.

(a) $\dfrac{\frac{1}{2}-\frac{1}{10}}{\frac{2}{5}}$ (b) $\dfrac{\frac{2}{3}+\frac{2}{x}}{\frac{5}{3}+\frac{5}{x}}$ (c) $\dfrac{\frac{3}{8}+\frac{1}{4x}}{\frac{7}{2x}+\frac{3}{4}}$

These types of problems can certainly involve more complicated secondary simplification. Don't forget the primary use of factoring in order to simplify.

***Exercise* #3:** Simplify each of the following complex fractions.

(a) $\dfrac{\frac{1}{2}-\frac{2}{x^2}}{\frac{3}{2x}-\frac{3}{x^2}}$ (b) $\dfrac{\frac{2}{5}-\frac{2}{x}}{\frac{1}{5x}-\frac{1}{x^2}}$ (c) $\dfrac{\frac{x}{12}+\frac{1}{6}-\frac{2}{x}}{\frac{x}{12}-\frac{4}{3x}}$

If the denominators of the minor fractions become more complex, be sure to factor them first, just as you did with the addition and subtraction in the previous lesson.

***Exercise* #4:** Simplify each of the following complex fractions.

(a) $\dfrac{\frac{4}{x+2}+\frac{2}{x-4}}{\frac{12x-24}{x^2-2x-8}}$ (b) $\dfrac{\frac{x}{x+6}-\frac{1}{x+2}}{\frac{x^2-4}{x^2+8x+12}}$