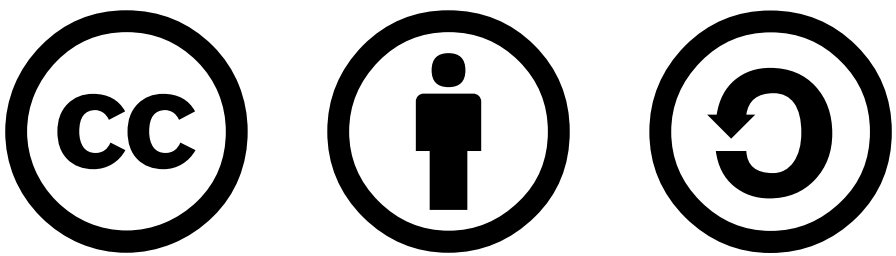


Algebra Lecture 18

Crista Moreno

December 7, 2016

Last Time

- Adding and Subtracting Rational Expressions
- Solving Rational Equations

Topics for Today

- Complex Fractions

Simplifying Complex Fractions

What is a Complex Fraction?

Complex Fraction

A **complex fraction** is a fraction of the form

$$\frac{\frac{p}{q}}{\frac{y}{z}},$$

where either the numerator or denominator is itself a fraction.

Simplify the following Complex Fraction

$$\frac{1+\frac{4}{49}}{1-\frac{2}{7}}$$

Simplify the following Complex Fraction

$$\frac{1+\frac{4}{49}}{1-\frac{2}{7}}$$

$$= \frac{\frac{49}{49}+\frac{4}{49}}{1-\frac{2}{7}}$$

$$= \frac{\frac{49+4}{49}}{1-\frac{2}{7}}$$

$$= \frac{\frac{49+4}{49}}{1-\frac{2}{7}}$$

$$= \frac{\frac{49+4}{49}}{1-\frac{2}{7}}$$

$$= \frac{\frac{53}{49}}{1 - \frac{2}{7}}$$

$$= \frac{\frac{53}{49}}{1 - \frac{2}{7}}$$

$$= \frac{\frac{53}{49}}{\frac{7}{7} - \frac{2}{7}}$$

$$= \frac{\frac{53}{49}}{\frac{7}{7} - \frac{2}{7}}$$

$$= \frac{\frac{53}{49}}{\frac{7}{7} - \frac{2}{7}}$$

$$= \frac{\frac{53}{49}}{\frac{7 - 2}{7}}$$

$$= \frac{\frac{53}{49}}{\frac{5}{7}}$$

$$= \frac{\frac{53}{49}}{\frac{5}{7}}$$

$$= \frac{53}{49} \times \frac{7}{5}$$

$$= \frac{\frac{53}{49}}{\frac{5}{7}}$$

$$= \frac{53}{49} \times \frac{7}{5}$$

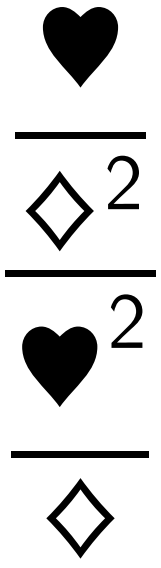
$$= \frac{53 \times 7}{49 \times 5}$$

$$= \frac{\frac{53}{49}}{\frac{5}{7}}$$

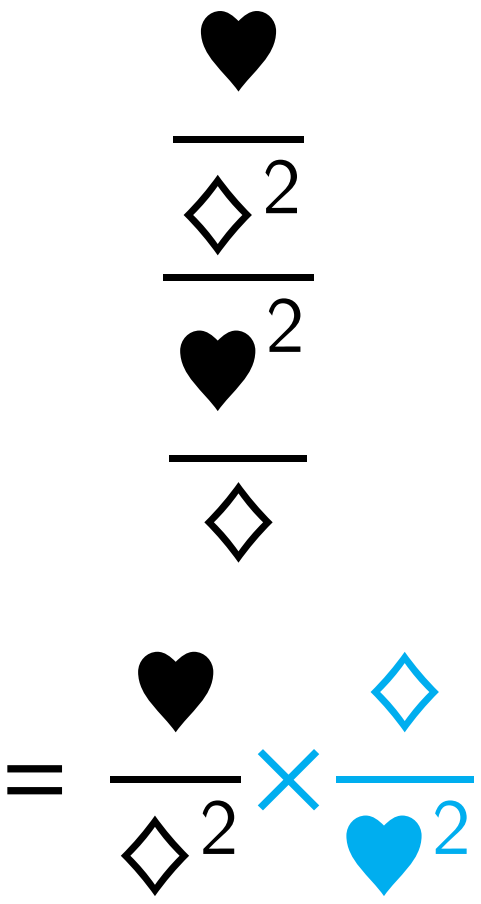
$$= \frac{53}{49} \times \frac{7}{5}$$

$$= \frac{53 \times 7}{49 \times 5} = \boxed{\frac{53}{35}}$$

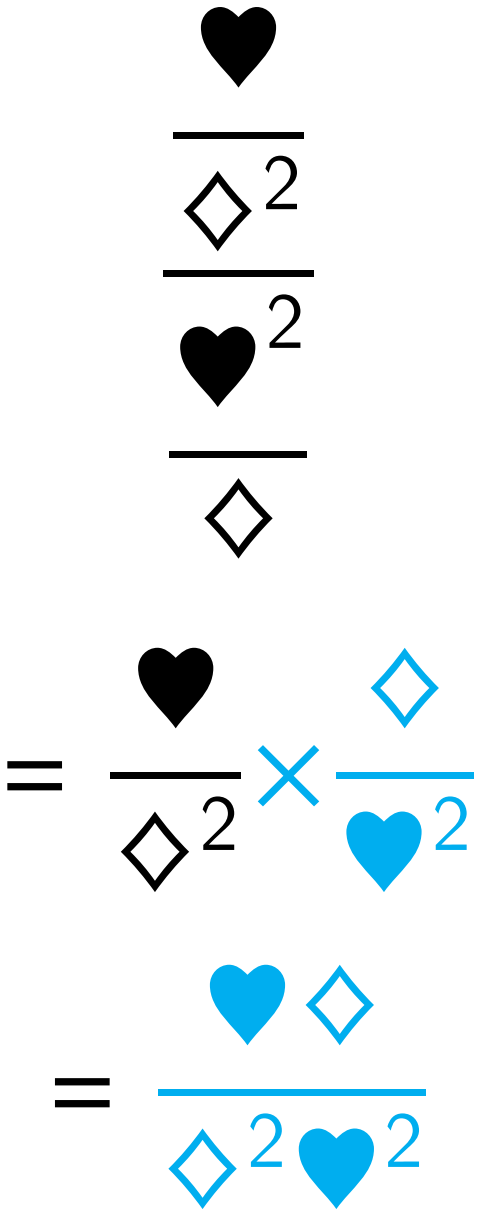
Simplify the following Complex Fraction

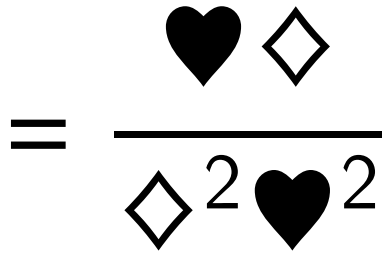


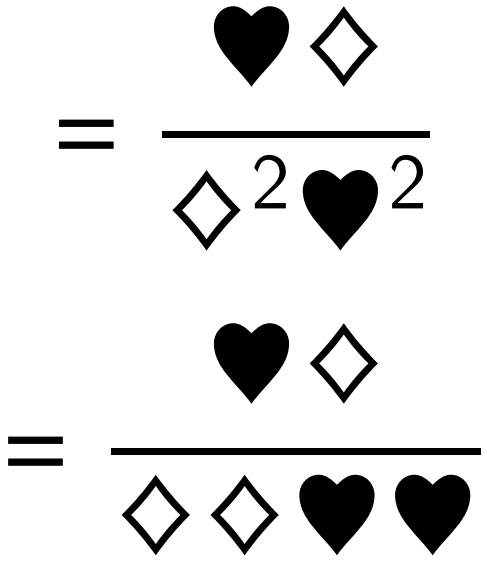
Simplify the following Complex Fraction

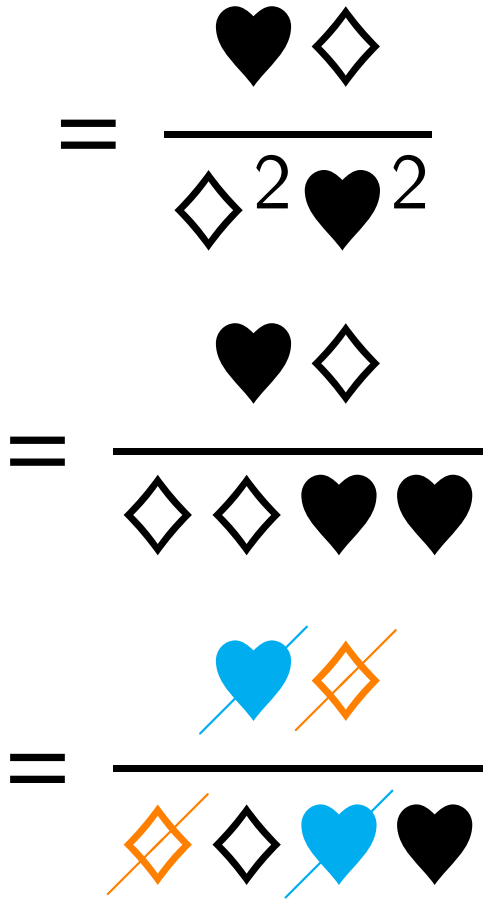


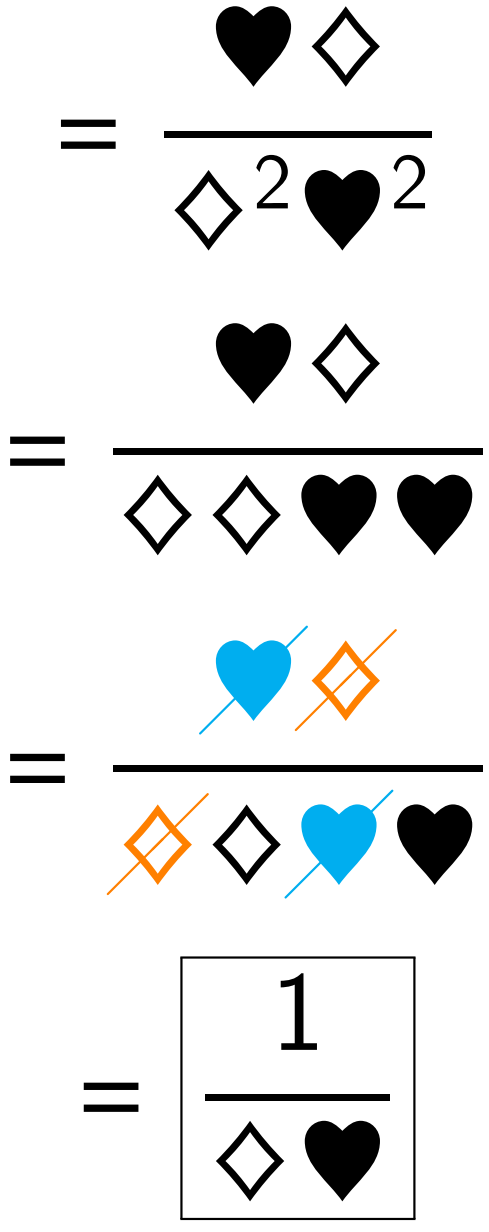
Simplify the following Complex Fraction











Simplify the following Complex Fraction

$$\frac{\frac{\clubsuit + 2}{5}}{\frac{\clubsuit - 9}{\clubsuit}}$$

Simplify the following Complex Fraction

$$\frac{\frac{\clubsuit + 2}{5}}{\frac{\clubsuit - 9}{\clubsuit}}$$

$$= \frac{\clubsuit + 2}{5} \times \frac{\clubsuit}{\clubsuit - 9}$$

Simplify the following Complex Fraction

$$\frac{\frac{\clubsuit + 2}{5}}{\frac{\clubsuit - 9}{\clubsuit}}$$

$$= \frac{\clubsuit + 2}{5} \times \frac{\clubsuit}{\clubsuit - 9}$$

$$= \boxed{\frac{(\clubsuit + 2)\clubsuit}{5(\clubsuit - 9)}}$$

Simplify the following Complex Fraction

$$\frac{\frac{1}{\spadesuit - 6}}{\frac{6}{\spadesuit^2 - 36}}$$

Simplify the following Complex Fraction

$$\frac{\frac{1}{\spadesuit - 6}}{\frac{6}{\spadesuit^2 - 36}}$$

$$= \frac{1}{\spadesuit - 6} \times \frac{\spadesuit^2 - 36}{6}$$

Simplify the following Complex Fraction

$$\frac{\frac{1}{\spadesuit - 6}}{\frac{6}{\spadesuit^2 - 36}}$$

$$= \frac{1}{\spadesuit - 6} \times \frac{\spadesuit^2 - 36}{6}$$

$$= \frac{1}{\spadesuit - 6} \times \frac{\spadesuit^2 - 6^2}{6}$$

$$\frac{1}{\spadesuit - 6} \times \frac{\spadesuit^2 - 6^2}{6}$$

$$\frac{1}{\spadesuit - 6} \times \frac{\spadesuit^2 - 6^2}{6}$$

$$= \frac{1}{\spadesuit - 6} \times \frac{(\spadesuit - 6)(\spadesuit + 6)}{6}$$

$$\frac{1}{\spadesuit - 6} \times \frac{\spadesuit^2 - 6^2}{6}$$

$$= \frac{1}{\spadesuit - 6} \times \frac{(\spadesuit - 6)(\spadesuit + 6)}{6}$$

$$= \frac{(\spadesuit - 6)(\spadesuit + 6)}{(\spadesuit - 6)6}$$

$$\frac{1}{\spadesuit - 6} \times \frac{\spadesuit^2 - 6^2}{6}$$

$$= \frac{1}{\spadesuit - 6} \times \frac{(\spadesuit - 6)(\spadesuit + 6)}{6}$$

$$= \frac{(\spadesuit - 6)(\spadesuit + 6)}{(\spadesuit - 6)6}$$

$$= \frac{\cancel{(\spadesuit - 6)}(\spadesuit + 6)}{\cancel{(\spadesuit - 6)}6} = \boxed{\frac{(\spadesuit + 6)}{6}}$$

Simplify the following Complex Fraction

$$\frac{\frac{1}{\heartsuit} + \frac{8}{\heartsuit^2}}{\frac{3}{\heartsuit} - \frac{4}{\heartsuit^2}}$$

Simplify the following Complex Fraction

$$\frac{\frac{1}{\heartsuit}+\frac{8}{\heartsuit^2}}{\frac{3}{\heartsuit}-\frac{4}{\heartsuit^2}}$$

$$=\frac{\frac{\heartsuit}{\heartsuit}\times\frac{1}{\heartsuit}+\frac{8}{\heartsuit^2}}{\frac{3}{\heartsuit}-\frac{4}{\heartsuit^2}}$$

$$= \frac{\frac{\heartsuit}{\heartsuit}\frac{1}{\heartsuit} + \frac{8}{\heartsuit^2}}{\frac{3}{\heartsuit} - \frac{4}{\heartsuit^2}}$$

$$= \frac{\frac{\heartsuit}{\heartsuit}\frac{1}{\heartsuit} + \frac{8}{\heartsuit^2}}{\frac{3}{\heartsuit} - \frac{4}{\heartsuit^2}}$$

$$= \frac{\frac{\heartsuit}{\heartsuit^2} + \frac{8}{\heartsuit^2}}{\frac{3}{\heartsuit} - \frac{4}{\heartsuit^2}}$$

$$= \frac{\frac{\heartsuit}{\heartsuit}\frac{1}{\heartsuit} + \frac{8}{\heartsuit^2}}{\frac{3}{\heartsuit} - \frac{4}{\heartsuit^2}}$$

$$= \frac{\frac{\heartsuit}{\heartsuit^2} + \frac{8}{\heartsuit^2}}{\frac{3}{\heartsuit} - \frac{4}{\heartsuit^2}} = \frac{\frac{\heartsuit + 8}{\heartsuit^2}}{\frac{3}{\heartsuit} - \frac{4}{\heartsuit^2}}$$

$$= \frac{\frac{\heartsuit + 8}{\heartsuit^2}}{\frac{3}{\heartsuit} - \frac{4}{\heartsuit^2}}$$

$$= \frac{\frac{\heartsuit + 8}{\heartsuit^2}}{\frac{3}{\heartsuit} - \frac{4}{\heartsuit^2}}$$

$$= \frac{\frac{\heartsuit + 8}{\heartsuit^2}}{\frac{\heartsuit}{\heartsuit} \times \frac{3}{\heartsuit} - \frac{4}{\heartsuit^2}}$$

$$= \frac{\frac{\heartsuit + 8}{\heartsuit^2}}{\frac{3}{\heartsuit} - \frac{4}{\heartsuit^2}}$$

$$= \frac{\frac{\heartsuit + 8}{\heartsuit^2}}{\frac{\heartsuit}{\heartsuit} \times \frac{3}{\heartsuit} - \frac{4}{\heartsuit^2}} = \frac{\frac{\heartsuit + 8}{\heartsuit^2}}{\frac{3\heartsuit}{\heartsuit^2} - \frac{4}{\heartsuit^2}}$$

$$= \frac{\frac{\heartsuit + 8}{\heartsuit^2}}{\frac{3\heartsuit}{\heartsuit^2} - \frac{4}{\heartsuit^2}}$$

$$= \frac{\frac{\heartsuit + 8}{\heartsuit^2}}{\frac{3\heartsuit}{\heartsuit^2} - \frac{4}{\heartsuit^2}}$$

$$= \frac{\frac{\heartsuit + 8}{\heartsuit^2}}{\frac{3\heartsuit - 4}{\heartsuit^2}}$$

$$= \frac{\frac{\heartsuit + 8}{\heartsuit^2}}{\frac{3\heartsuit}{\heartsuit^2} - \frac{4}{\heartsuit^2}}$$

$$= \frac{\frac{\heartsuit + 8}{\heartsuit^2}}{\frac{3\heartsuit - 4}{\heartsuit^2}} = \frac{\heartsuit + 8}{\heartsuit^2} \times \frac{\heartsuit^2}{3\heartsuit - 4}$$

$$= \frac{\heartsuit + 8}{\heartsuit^2} \times \frac{\heartsuit^2}{3\heartsuit - 4}$$

$$= \frac{\heartsuit + 8}{\heartsuit^2} \times \frac{\heartsuit^2}{3\heartsuit - 4}$$

$$= \frac{(\heartsuit + 8)\heartsuit^2}{\heartsuit^2(3\heartsuit - 4)}$$

$$= \frac{\heartsuit + 8}{\heartsuit^2} \times \frac{\heartsuit^2}{3\heartsuit - 4}$$

$$= \frac{(\heartsuit + 8)\heartsuit^2}{\heartsuit^2(3\heartsuit - 4)}$$

$$= \frac{(\heartsuit + 8)\cancel{\heartsuit^2}}{\cancel{\heartsuit^2}(3\heartsuit - 4)}$$

$$= \frac{\heartsuit + 8}{\heartsuit^2} \times \frac{\heartsuit^2}{3\heartsuit - 4}$$

$$= \frac{(\heartsuit + 8)\heartsuit^2}{\heartsuit^2(3\heartsuit - 4)}$$

$$= \frac{(\heartsuit + 8)\cancel{\heartsuit^2}}{\cancel{\heartsuit^2}(3\heartsuit - 4)} = \boxed{\frac{(\heartsuit + 8)}{(3\heartsuit - 4)}}$$

Topics Discussed Thus Far

- Polynomials
- Factoring Polynomials & Trinomials
- Special Cases of Factoring
- Polynomial Equations
- Rational Functions & Domains of Rational Functions
- Multiplying, Dividing, Adding, & Subtracting Rational Expressions
- Rational Equations
- Complex Fractions