ADDING AND SUBTRACTING FRACTIONS WITH VARIABLES

(more mathematical cats)

To add or subtract fractions:

- You must have a common denominator.
- To find the **L**east **C**ommon **D**enominator (**LCD**),
  take the least common multiple of the individual denominators.
- Express each fraction as a new fraction with the common denominator,
  by multiplying by one in an appropriate form.
- To add fractions with the same denominator:
  add the numerators, and keep the denominator the same.
  That is, use the rule:

$$\frac{A}{C} + \frac{B}{C} = \frac{A+B}{C}$$

EXAMPLE:

Question:

Combine into a single fraction: $\dfrac{2}{x+3} - \dfrac{3x}{x-1}$

Solution:

Note that the LCD is $(x+3)(x-1)$.

$\dfrac{2}{x+3} - \dfrac{3x}{x-1}$ (original expression)

$= \dfrac{2}{x+3} \cdot \dfrac{x-1}{x-1} - \dfrac{3x}{x-1} \cdot \dfrac{x+3}{x+3}$ (get a common denominator by multiplying by 1)

$= \dfrac{2(x-1) - 3x(x+3)}{(x+3)(x-1)}$ (keep the denominator the same; add the numerators)

$= \dfrac{2x - 2 - 3x^2 - 9x}{(x+3)(x-1)}$ (multiply out the numerator)

$= \dfrac{-3x^2 - 7x - 2}{(x+3)(x-1)}$ (combine like terms; write numerator in standard form)

Leave the denominator in factored form for your final answer.