

Pre-Calculus 11

Lesson 6.3 ~ Adding & Subtracting Rational Expressions

Adding and subtracting rational expressions is the same as adding and subtracting fractions: you must have a common denominator.

Example #1: Simplify each rational expression and identify all non-permissible values.

$$\begin{aligned} \text{a) } \frac{m}{n} - \frac{m+1}{n} &= \frac{m - (m+1)}{n} \\ &= \frac{m - m - 1}{n} \\ &= \boxed{\frac{-1}{n}}, n \neq 0 \end{aligned}$$

$$\begin{aligned} \text{b) } \frac{2x^2-x}{(x-3)(x+1)} + \frac{3-6x}{(x-3)(x+1)} - \frac{8}{(x-3)(x+1)} \\ &= \frac{(2x^2-x) + (3-6x) - (8)}{(x-3)(x+1)} \end{aligned}$$

$$= \frac{2x^2 - x - 6x + 3 - 8}{(x-3)(x+1)}$$

$$= \boxed{\frac{2x^2 - 7x - 5}{(x-3)(x+1)}}, x \neq 3, -1$$

← can't be factored

$$\begin{aligned}
 \text{c) } \frac{4}{p^2-1} + \frac{3}{p+1} &= \frac{4}{(p+1)(p-1)} + \frac{3}{p+1} \\
 &= \frac{4}{(p+1)(p-1)} + \frac{3(p-1)}{(p+1)(p-1)} \\
 &= \frac{4 + 3p - 3}{(p+1)(p-1)} \\
 &= \boxed{\frac{3p+1}{(p+1)(p-1)}} , p \neq \pm 1
 \end{aligned}$$

$$\begin{aligned}
 \text{d) } \frac{x-1}{x^2+x-6} - \frac{x-2}{x^2+4x+3} &= \frac{x-1}{(x+3)(x-2)} - \frac{x-2}{(x+3)(x+1)} \\
 &= \frac{(x-1)(x+1)}{(x+3)(x-2)(x+1)} - \frac{(x-2)(x-2)}{(x+3)(x-2)(x+1)} \\
 &= \frac{(x^2-1) - (x^2-4x+4)}{(x+3)(x-2)(x+1)} \\
 &= \boxed{\frac{4x-5}{(x+3)(x-2)(x+1)}} , x \neq -1, -3, 2
 \end{aligned}$$