7.2 Adding & Subtracting Rationals

old Adding & Subtracting Fractions

① $\frac{4}{5} + \frac{3}{5} = \frac{7}{5}$

② $\frac{-2}{11} + \frac{7}{11} = \frac{5}{11}$

What if fractions do not have the same denominator? Find the least common multiple (LCM).

① $\frac{1}{2} + \frac{3}{5}$

2 5
4 10
6
8 10
12

$= \frac{1 \cdot 5}{2 \cdot 5} + \frac{3 \cdot 2}{5 \cdot 2}$

$= \frac{5}{10} + \frac{6}{10} = \frac{5+6}{10}$

$= \frac{11}{10}$

② $\frac{2}{3} - \frac{1}{6}$

3 6
6 12
9 24
12
15

$= \frac{2 \cdot 2}{3 \cdot 2} - \frac{1 \cdot 1}{6 \cdot 1}$

$= \frac{4}{6} - \frac{1}{6} = \frac{4-1}{6}$

$= \frac{3}{6} = \frac{1}{2}.$

new Adding & Subtracting Rational Expressions

Basic Idea: You may add & subtract rational expressions if they have the same denominator.

① $\frac{3x-4}{x+3} + \frac{2x+5}{x+3} = \frac{(3x-4)+(2x+5)}{x+3} = \frac{3x-4+2x+5}{x+3} = \frac{5x+1}{x+3}.$

② $\frac{2x-1}{x^2+2} - \frac{4x+4}{x^2+2} = \frac{(2x-1)-(4x+4)}{x^2+2} = \frac{2x-1-4x-4}{x^2+2} = \frac{-2x-5}{x^2+2}$

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

$= \frac{x^2+2}{x^2}$.

④ $\frac{x-1}{x^2+3x+2} + \frac{x}{x+1} = \frac{x-1}{(x+2)(x+1)} + \frac{x}{x+1} = \frac{x-1}{(x+2)(x+1)} + \frac{x(x+2)}{(x+1)(x+2)}$

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

⑤ $\frac{x+4}{5} + \frac{x}{x+5} = \frac{x+4(x+5)}{5(x+5)} + \frac{x(5)}{(x+5)(5)} = \frac{(x+4)(x+5)+5x}{5(x+5)}$

$= \frac{x^2+9x+20+5x}{5(x+5)} = \frac{x^2+14x+20}{5(x+5)}$.