Adding and Subtracting Rational Expressions II.

Ex. 1. Simplify and state restrictions.

a) $\frac{1}{4x} + \frac{1}{4}$ LCD: $4x$

$= \frac{1}{4x} + \frac{1}{4}\cdot\frac{x}{x}$

$= \frac{1}{4x} + \frac{x}{4x}$

$= \frac{1+x}{4x}$, $x \neq 0$.

TIPS: When denominators are monomials

1. Find LCD of the coefficients first
   - it will never be smaller than the largest coefficient
2. Use the variable with the largest exponent as the LCD of the variable

b) $\frac{1}{5x} + \frac{1}{2x^2}$

$= \frac{2x}{2x}\cdot\frac{1}{5x} + \frac{5}{5}\cdot\frac{1}{2x^2}$

$= \frac{2x+5}{10x^2}$, $x \neq 0$.

LCD
2, 5
x, x^2 } $10x^2$

c) $\frac{7}{6x^2} + \frac{x-1}{x^3} - \frac{x+2}{2x}$

LCD
6, 2
x^2, x^3, x } 6, x^3 $6x^3$

$= \frac{7}{6x^2}\cdot\frac{x}{x} + \frac{6\cdot(x-1)}{6\cdot x^3} - \frac{3x^2\cdot(x+2)}{3x^2\cdot 2x}$

$= \frac{7x + 6(x-1) - 3x^2(x+2)}{6x^3}$

$= \frac{7x + 6x - 6 - 3x^3 - 6x^2}{6x^3}$ *

$= \frac{-3x^3 - 6x^2 + 13x - 6}{6x^3}$, $x \neq 0$.

* put answer in factored form.

Since numerator does not have a factor of $6x^3$ as a factor, fraction does not reduce.

d) $\dfrac{2}{5mn} - \dfrac{3n+m^2}{2m^2} + 3$

LCD

$1, 5, 2$ | 10
m, m^2 | m^2
n | n

$10m^2n$

$$= \frac{2m \cdot 2}{2m \cdot 5mn} - \frac{5n(3n+m^2)}{5n \cdot 2m^2} + \frac{10m^2n \cdot 3}{10m^2n \cdot 1}$$

$$= \frac{4m - 5n(3n+m^2) + 30m^2n}{10m^2n}$$

$$= \frac{4m - 15n^2 - 5m^2n + 30m^2n}{10m^2n}$$

$$= \frac{4m + 25m^2n - 15n^2}{10m^2n}, \quad m, n \neq 0.$$

2, 5, 10, m, n are not CF's in numerator so cannot reduce

e) $\dfrac{2a}{a^2-6a+8} + \dfrac{7a}{a^2-a-12}$

$$= \frac{2a}{(a-4)(a-2)} + \frac{7a}{(a-4)(a+3)}$$

LCD $(a-4)(a-2)(a+3)$

$$= \frac{2a}{(a-4)(a-2)} \cdot \frac{(a-3)}{(a-3)} + \frac{7a}{(a-4)(a+3)} \cdot \frac{(a-2)}{(a-2)}$$

$$= \frac{2a(a+3) + 7a(a-2)}{(a-4)(a-2)(a+3)}$$

$$= \frac{2a^2 + 6a + 7a^2 - 14a}{(a-4)(a-2)(a+3)}$$

$$= \frac{9a^2 - 8a}{(a-4)(a-2)(a+3)}, \quad a \neq 4, 2, -3.$$

f) $\dfrac{2}{3x-6} + \dfrac{5x}{x^2-4x+4}$

$$= \frac{2}{3(x-2)} + \frac{5x}{(x-2)^2}$$

LCD $3(x-2)(x-2)$.

$$= \frac{2}{3(x-2)} \cdot \frac{(x-2)}{(x-2)} + \frac{5x}{(x-2)^2} \cdot \frac{3}{3}$$

$$= \frac{2(x-2) + 5x(3)}{3(x-2)^2}$$

$$= \frac{2x - 4 + 15x}{3(x-2)^2}$$

$$= \frac{17x - 4}{3(x-2)^2}$$

HW: (Double for some).
Pg 67-68 # 3aceg, 5ace, 6acegi, 8ace, 9ace, 10acegi