Subtract: $\dfrac{y^2-5y}{y^2-4} - \dfrac{(6y-6)\,(-1)}{4-y^2\,(-1)}$

$$\frac{y^2-5y}{y^2-4} - \frac{(-6y+6)}{y^2-4}$$

$$\frac{y^2-5y+6y-6}{y^2-4}$$

$$\frac{y^2+y-6}{y^2-4} = \frac{(y+3)(y-2)}{(y+2)(y-2)}$$

$$\frac{y+3}{y+2} \qquad y \neq \pm 2$$

Subtract: $\dfrac{2n^2+8n-1}{n^2-1} - \dfrac{n^2-7n-1}{1-n^2} \dfrac{(-1)}{(-1)}$

$$\dfrac{2n^2+8n-1}{n^2-1} - \dfrac{(-n^2+7n+1)}{n^2-1}$$

$$\dfrac{2n^2+8n-1+n^2-7n-1}{n^2-1}$$

$$\dfrac{3n^2+n-2}{n^2-1} \qquad \dfrac{(3n-2)(n+1)}{(n+1)(n-1)}$$

$$\dfrac{3n-2}{n-1} \quad n \neq \pm 1$$

Find the Least Common Denominator of Rational Expressions

$$\frac{7 \, (3)}{12 \, (3)} + \frac{5 \, (2)}{18 \, (2)} = \frac{21}{36} + \frac{10}{36}$$

$$\frac{31}{36}$$

LCD

$$12 = 2 \cdot 2 \cdot 3$$

$$18 \quad 2 \quad \cdot 3 \cdot 3$$

$$\overline{2 \cdot 2 \cdot 3 \cdot 3}$$

$$LCD = 36$$

Find the least common denominator of rational expressions.

Step 1. Factor each denominator completely.

Step 2. List the factors of each denominator. Match factors vertically when possible.

Step 3. Bring down the columns by including all factors, but do not include common factors twice.

Step 4. Write the LCD as the product of the factors.

@ Find the LCD for the expressions $\frac{8}{x^2-2x-3}$, $\frac{3x}{x^2+4x+3}$ and ⓑ rewrite them as equivalent rational expressions with the lowest common denominator.

a) $x^2-2x-3 = (x-3)(x+1)$

$x^2+4x+3 = \underline{\hspace{1cm}(x+1)\ (x+3)\hspace{1cm}}$

$LCD = (x-3)(x+1)(x+3)$

b) $\frac{8}{(x-3)(x+1)(x+3)}$ $(x+3)$ $\frac{8x+24}{(x-3)(x+1)(x+3)}$

$\frac{3x}{(x+1)(x+3)}$ $\frac{(x-3)}{(x-3)} = \frac{3x^2-9x}{(x+1)(x+3)(x-3)}$

ⓐ Find the LCD for the expressions $\dfrac{2}{x^2-x-12}$, $\dfrac{1}{x^2-16}$ ⓑ rewrite them as equivalent rational expressions with the lowest common denominator.

a) $x^2 - x - 12 = (x-4)(x+3)$

$x^2 - 16 = \dfrac{(x-4) \qquad (x+4)}{}$

LCD $(x-4)(x+3)(x+4)$

b) $\dfrac{2}{(x-4)(x+3)} \dfrac{(x+4)}{(x+4)} = \dfrac{2x+8}{(x-4)(x+3)(x+4)}$

$\dfrac{1}{(x-4)(x+4)} \dfrac{(x+3)}{(x+3)} = \dfrac{x+3}{(x-4)(x+3)(x+4)}$

ⓐ Find the LCD for the expressions $\dfrac{3x}{x^2-3x-10}$, $\dfrac{5}{x^2+3x+2}$ ⓑ rewrite them as equivalent rational expressions with the lowest common denominator.

$$x^2-3x-10 = (x-5)(x+2)$$

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

$$LCD \ (x-5)(x+2)(x+1)$$

$$\frac{3x}{(x-5)(x+2)}\frac{(x+1)}{(x+1)} = \frac{3x^2+3x}{(x-5)(x+2)(x+1)} \Bigg/ \frac{5}{(x+2)(x+1)}\frac{(x-5)}{(x-5)} \ \frac{5x-25}{(x+2)(x+1)(x-5)}$$

HOW TO

Add or subtract rational expressions.

Step 1. Determine if the expressions have a common denominator.

- ○ **Yes** – go to step 2.
- ○ **No** – Rewrite each rational expression with the LCD.

  - ▪ Find the LCD.
  - ▪ Rewrite each rational expression as an equivalent rational expression with the LCD.

Step 2. Add or subtract the rational expressions.
Step 3. Simplify, if possible.

Add: $\dfrac{3}{(x-3)(x-2)}^{(x-2)} + \dfrac{2}{(x-2)}^{(x-3)} \cdot (x-3)$

LCD: $\dfrac{x-3 \quad x-2}{(x-3)(x-2)}$

$\dfrac{3x-6}{(x-3)(x-2)} + \dfrac{2x-6}{(x-3)(x-2)} = \dfrac{5x-12}{(x-3)(x-2)}$

$$LCD = (x-2)(x+3)$$

Add: $\dfrac{2}{(x-2)}\overset{(x+3)}{\underset{(x+3)}{+}} \dfrac{5}{(x+3)}\underset{(x-2)}{\overset{(x-2)}{}}$

$$\dfrac{2x+6}{(x-2)(x+3)} + \dfrac{5x-10}{(x-2)(x+3)} \qquad = \dfrac{7x-4}{(x-2)(x+3)}$$

Add: $\dfrac{4}{m+3} + \dfrac{3}{m+4}$.

Add: $\dfrac{8\,(x+3)}{x^2-2x-3} + \dfrac{3x\,(x-3)}{x^2+4x+3}.$

$x^2-2x-3 = (x-3)(x+1)$

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

$\dfrac{8x+24}{(x-3)(x+1)(x+3)} + \dfrac{3x^2-9x}{(x-3)(x+1)(x+3)} = \dfrac{3x^2-x+24}{(x-3)(x+1)(x+3)}$

Add: $\dfrac{(2n)(n+3)}{n^2-3n-10} + \dfrac{(6)(n-5)}{n^2+5n+6}$

$\dfrac{2n^2+6n}{(n-5)(n+2)(n+3)} + \dfrac{6n-30}{(n-5)(n+2)(n+3)}$

$\dfrac{2n^2+12n-30}{(n-5)(n+2)(n+3)}$

$\dfrac{(n-5)(n+2)}{(n+2)(n+3)}$

LCD $(n-5)(n+2)(n+3)$

$2(n^2+6n-15)$

Subtract: $\dfrac{8y}{y^2-16} - \dfrac{4(y+4)}{y-4}.$

LCD $(y-4)(y+4)$
$\dfrac{(y-4)}{(y-4)(y+4)}$

$\dfrac{8y}{(y-4)(y+4)} - \dfrac{(4y+16)}{(y-4)(y+4)}$

$\dfrac{8y-4y-16}{(y-4)(y+4)} = \dfrac{4y-16}{(y-4)(y+4)} = \dfrac{4(y-4)}{(y-4)(y+4)}$

$= \dfrac{4}{y+4}$

Subtract: $\dfrac{2x}{x^2-4} - \dfrac{1}{x+2}$.

Subtract: $\dfrac{-3n-9}{n^2+n-6} - \dfrac{n+3}{(2-n)} \cdot \dfrac{(-1)}{(-1)}$

$n^2+n-6 = (n+3)(n-2)$

$n-2$ _____ $(n-2)$

$LCD = (n+3)(n-2)$

$\dfrac{-3n-9}{n^2+n-6} - \dfrac{(-n-3)(n+3)}{n-2}$

$\dfrac{-3n-9}{(n+3)(n-2)} - \dfrac{\left(-n^2-6n-9\right)}{(n+3)(n-2)}$

$\dfrac{-3n-9+n^2+6n+9}{(n+3)(n-2)} = \dfrac{n^2+3n}{(n+3)(n-2)} \qquad \dfrac{n\cancel{(n+3)}}{\cancel{(n+3)}(n-2)}$

$\dfrac{n}{n-2}$

7.2

91 - 97 odd

100, 104

107 - 113 odd