7.4 Add and Subtract Rational Expressions

1) $\frac{a}{a-5} + \frac{a+1}{a+7}$

LCD = (a – 5)(a + 7)

$\frac{a(a+7)}{(a-5)(a+7)} + \frac{(a+1)(a-5)}{(a+7)(a-5)}$

You multiply the first fraction up and down by a + 7

You multiply the second fraction up and down by a – 5

They now both have the same LCD

Now you add the numerators (top part) and get

a(a + 7) + (a + 1)(a – 5) = a^2 + 7a + a^2 -4a – 5 (distribute the first part) (foil the second part)

you then combine like terms and get : $2a^2$ + 3a - 5 which you can factor to (2a + 5)(a – 1)

You now have

$$\frac{(2a+5)(a-1)}{(a-5)(a+7)}$$

2) $\frac{x-19}{(x+3)(x+5)} + \frac{x-7}{x+5}$

LCD= (x + 3)(x + 5)

$\frac{x-19}{(x+3)(x+5)} + \frac{(x-7)(x+3)}{(x+5)(x+3)}$

You keep the first fraction (already over the LCD)

You multiply the second fraction by (x +3) on the top and bottom to get to the LCD

Now you can add the top (numerators)

You have to foil (x – 7)(x + 3) and get $x^2 – 4x – 21$

You then add (x - 19) + ($x^2 – 4x -21$) and get $x^2 – 3x – 40$ which can be factored to (x + 5)(x - 8)

You then have:

$$\frac{(x+5)(x-8)}{(x+3)(x+5)}$$

Which simplifies to:

$$\frac{x-8}{x+3}$$