

Exercise A.5.27 Perform the indicated operation and simplify the result. Leave your answer in factored form:

$$\frac{x}{x^2-7x+6} - \frac{x}{x^2-2x-24}$$

Solution

Notice that $x^2-7x+6 = (x-6)(x-1)$ and $x^2-2x-24 = (x-6)(x+4)$. So

$$\frac{x}{x^2-7x+6} - \frac{x}{x^2-2x-24} = \frac{x}{(x-6)(x-1)} - \frac{x}{(x-6)(x+4)}$$

The LCM of the denominators is $(x-6)(x-1)(x+4)$, so we consider

$$\frac{x}{(x-6)(x-1)} \left(\frac{x+4}{x+4} \right) - \frac{x}{(x-6)(x+4)} \left(\frac{x-1}{x-1} \right)$$

$$= \frac{x(x+4)}{(x-6)(x-1)(x+4)} - \frac{x(x-1)}{(x-6)(x+4)(x-1)}$$

$$= \frac{x(x+4) - x(x-1)}{(x-6)(x-1)(x+4)} = \frac{x^2+4x - x^2+x}{(x-6)(x-1)(x+4)}$$

$$= \boxed{\frac{5x}{(x-6)(x-1)(x+4)}} \quad \square$$