

1 (10 pts). Perform the arithmetic operations and simplify the result.

$$\frac{1}{x-3} \left[\frac{1}{(x+2)^2} - \frac{1}{25} \right]$$

1.(Source: 1.5.26a) First subtract the fractions.

$$\frac{1}{(x+2)^2} - \frac{1}{25} = \frac{25}{25} \cdot \frac{1}{(x+2)^2} - \frac{1}{25} \cdot \frac{(x+2)^2}{(x+2)^2} = \frac{25 - (x+2)^2}{25(x+2)^2}$$

Now the multiplication.

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

To check for common factors, we must factor the numerator. Either expand it and then factor the quadratic, or factor it as it stands now using the difference of squares:

$$\frac{(5 - (x+2))(5 + (x+2))}{(x-3)25(x+2)^2} = \frac{(3-x)(7+x)}{(x-3)25(x+2)^2} = \frac{-(x-3)(7+x)}{(x-3)25(x+2)^2} = -\frac{(7+x)}{25(x+2)^2}.$$

(done)