I. Simplify:

7. $\dfrac{1}{x^2 - 7x + 12} + \dfrac{1}{x^2 - 5x + 6}$

Solution: $\dfrac{1}{x^2 - 7x + 12} + \dfrac{1}{x^2 - 5x + 6} = \dfrac{1}{(x-3)(x-4)} + \dfrac{1}{(x-2)(x-3)}$

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

$$= \frac{2x - 6}{(x-2)(x-3)(x-4)} = \frac{2(x-3)}{(x-2)(x-3)(x-4)}$$

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

I. Simplify:

8. $\dfrac{x}{x - y} - \dfrac{y}{x + y} - \dfrac{2xy}{x^2 - y^2}$

Solution:

$$\frac{x}{x - y} - \frac{y}{x + y} - \frac{2xy}{x^2 - y^2} = \frac{x(x + y) - y(x - y) - 2xy}{x^2 - y^2}$$

$$= \frac{x^2 + xy - xy + y^2 - 2xy}{x^2 - y^2}$$

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

I. Simplify:

9. $\left(\dfrac{2x + 5}{x + 1} + \dfrac{x^2 + 1}{x^2 - 1}\right) - \left(\dfrac{3x - 2}{x - 1}\right)$

Solution:

$$\left(\frac{2x + 5}{x + 1} + \frac{x^2 + 1}{x^2 - 1}\right) - \left(\frac{3x - 2}{x - 1}\right) = \frac{2x + 5}{x + 1} - \frac{3x - 2}{x - 1} + \frac{x^2 + 1}{x^2 - 1}$$