

Simplify completely.

1. $\frac{2}{3x+1} + \frac{x}{3x+1}$

$$\frac{2+x}{3x+1}$$

2. $\frac{x}{x^2-4x+3} + \frac{5}{x-3}$

$$\frac{x}{(x-3)(x-1)} + \frac{5}{x-3} \cdot \frac{x-1}{x-1}$$

$$\frac{x + 5x - 5}{(x-3)(x-1)}$$

$$\frac{6x-5}{(x-3)(x-1)}$$

3. $\frac{3x}{x-5} - \frac{2}{x^2-25}$

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

$$\frac{3x^2+15x-2}{(x+5)(x-5)}$$

4. $2 + \frac{x}{x^2-2}$

$$\frac{x^2-2}{x^2-2} \cdot \frac{2}{1} + \frac{x}{x^2-2}$$

$$\frac{2x^2-4+x}{x^2-2}$$

$$\frac{2x^2+x-4}{x^2-2}$$

$$5. \frac{x-2}{x^2+x-12} + \frac{x}{x^2-2x-3}$$

$$\frac{x+1}{x+1} \cdot \frac{x-2}{(x+4)(x-3)} + \frac{x}{(x-3)(x+1)} = \frac{x+4}{x+4}$$

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

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

$$\frac{(2x-1)(x+2)}{(x+1)(x+4)(x-3)}$$

$$6. \frac{x^2}{x-y} + \frac{y^2}{y-x}$$

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

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

$$\frac{x^2-y^2}{x-y}$$

$$\frac{(x+y)(\cancel{x-y})}{\cancel{x-y}}$$

$$x+y$$