1.

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

$G = \mathbb{Z}$

$x \neq +1; -1$

$$\frac{2x}{(x+1)(x-1)} = \frac{x}{x+1} - \frac{x+1}{x-1} \quad \Big| \cdot(x+1) \cdot(x-1)$$

$$2x = x\cdot(x-1) - (x+1)(x+1)$$

$$2x = x^2 - x - (x^2 + 2x + 1)$$

$$2x = x^2 - x - x^2 - 2x - 1$$

$$2x = -3x - 1 \quad | +3x$$

$$5x = -1 \quad | :5$$

$$x = -\frac{1}{5}$$

$$\mathbb{L} = \{\}$$

$G = \mathbb{Z}$

2.

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

$x \neq 0; 2; -2$

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

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

$$x^2 - 3x + 2 = 4x^2 - 16 - 3x^2$$

$$\cancel{x^2} - 3x + 2 = \cancel{x^2} - 16 \quad | -x^2$$

$$-3x + 2 = -16 \quad | +3x$$

$$2 = 3x - 16 \quad | +16$$

$$18 = 3x \quad | :3$$

$$6 = x$$

$$\mathbb{L} = \{6\}$$

3.

$$\frac{x-1}{x^2-9} = \frac{1}{x^2-3x} + \frac{1}{x-3}$$

$G = \mathbb{R}$

$x \neq 0; +3; -3$

$$\frac{x-1}{(x+3)(x-3)} = \frac{1}{x(x-3)} + \frac{1}{x-3} \quad \Big| \cdot(x+3) \; \cdot(x-3) \; \cdot x$$

$$(x-1)\cdot x = 1\cdot(x+3) + 1\cdot(x+3)\cdot x$$

$$x^2 - x = x + 3 + x^2 + 3x$$

$$x^2 - x = x^2 + 4x + 3 \quad | -x^2$$

$$-x = 4x + 3 \quad | +x$$

$$0 = 5x + 3 \quad | -3$$

$$-3 = 5x \quad | :5$$

$$-\frac{3}{5} = x$$

$$\mathbb{L} = \left\{-\frac{3}{5}\right\}$$