

20. Rationaalilausekkeiden laskenta-identiteettiä

Ket. lausekkeille lasketaan samalla periaatteella kuin murtoluvuille

$$20.2 \text{ a) } \frac{2}{3x} + \frac{3}{2x} = \frac{2}{6x} + \frac{3(x-1)}{6x} = \frac{2+3(x-1)}{6x} = \frac{3x-1}{6x}, x \neq 0$$

$$\text{b) } \frac{x+1}{3x} - \frac{x-1}{2x} = \frac{2(x+1)}{6x} - \frac{3(x-1)}{6x} = \frac{2(x+1)-3(x-1)}{6x} = \frac{2x+2-3x+3}{6x} = \frac{-x+5}{6x}$$

$$\text{c) } \frac{x+3}{x} + \frac{2x}{x-1} = \frac{(x-1)(x+3)}{x(x-1)} + \frac{2x^2}{x(x-1)} = \frac{(x-1)(x+3)+2x^2}{x(x-1)}$$

$$= \frac{x^2+2x-3+2x^2}{x(x-1)} = \frac{3x^2+2x-3}{x(x-1)} = \frac{3x^2+2x-3}{x^2-x}, x \neq 0, x \neq 1$$

$$20.4 \text{ a) } \frac{2}{x^2+x} + \frac{3-x}{x+1} = \frac{2}{x(x+1)} + \frac{x+3-x}{x+1} = \frac{2}{x(x+1)} + \frac{x(3-x)}{x(x+1)}$$

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

$x \neq -1, x \neq 0$

$$\text{b) } \frac{x-1}{x^2-9} - \frac{x}{x+3} = \frac{x-1}{(x-3)(x+3)} - \frac{x(x-3)}{(x-3)(x+3)}$$

$$= \frac{x-1-x(x-3)}{(x-3)(x+3)} = \frac{-x^2+4x-1}{(x-3)(x+3)} \left(= \frac{-x^2+4x-1}{x^2-9} \right), x \neq \pm 3$$

21. Rationaaliyhtälö

Esim: $\frac{x}{x+5} - \frac{1}{x} = 1 \quad | \cdot (x+5)x \neq 0, x \neq -5, x \neq 0$

$$\Leftrightarrow \cancel{(x+5)}x \cdot \frac{x}{\cancel{x+5}} - \cancel{(x+5)}x \cdot \frac{1}{x} = (x+5)x \cdot 1$$

$$\Leftrightarrow x^2 - (x+5) = x^2 + 5x$$

$$\Leftrightarrow -x - 5 = 5x$$

$$\Leftrightarrow -5 = 6x \quad | :6 \neq 0 \quad \Leftrightarrow x = -\frac{5}{6} \quad \text{Vast. } \underline{x = -\frac{5}{6}}$$