

Sčítání, odčítání, násobení a dělení lomených výrazů

$$1) \quad \frac{x-3}{2x} - \frac{x-2}{x-1}$$

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

$$3) \quad \frac{n+2}{n+4} + \frac{n-3}{8+2n}$$

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

$$5) \quad \frac{x+2}{x-1} - \frac{x-3}{1-x}$$

$$6) \quad 1 - \frac{2x-1}{x+4}$$

$$7) \quad \frac{a+b}{a^2} + \frac{a-b}{ab}$$

$$8) \quad 2a - \frac{a^2-3}{a}$$

$$9) \quad \frac{4-3a}{2+a} + 2$$

$$10) \quad \frac{1-2x}{x^2+5x} + \frac{3}{5x+25}$$

$$11) \quad \frac{3}{2a-3} - \frac{1-a}{4a^2-9}$$

$$12) \quad \frac{a^2-b^2}{a+b} \cdot \frac{a}{2a-2b}$$

$$13) \quad \frac{5}{x-y} \cdot (x^2-y^2)$$

$$14) \quad \frac{x+y}{x-y} \cdot \frac{(x-y)^2}{x^2-y^2}$$

$$15) \quad \left(\frac{x}{y} - \frac{y}{x}\right) \cdot \frac{xy}{x+y}$$

$$16) \quad \left(\frac{a}{b} - 1\right) \cdot \frac{2b}{a^2-b^2}$$

$$17) \quad \left(1 - \frac{n}{n+1}\right) \cdot \left(n - \frac{1}{n}\right)$$

$$18) \quad \frac{3}{c-1} - \frac{3}{c^2-c}$$

$$19) \quad \frac{a^2+ab}{a} : \frac{b}{ab+b^2}$$

$$20) \quad \left(u + \frac{u}{u-1}\right) : \left(1 + \frac{1}{u^2-1}\right)$$

$$21) \quad \frac{\frac{1}{a+a^2}}{\frac{a-1}{a^2-1}}$$

$$22) \quad \frac{\frac{u+1}{1-u}}{\left(1 - \frac{u}{u-1}\right)}$$

$$23) \quad \frac{\frac{x+y}{x-y}}{x^2-y^2} =$$

$$24) \quad \frac{\frac{1-a}{a^2-1}}{1+a} =$$

Řešení

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

$$2) \quad \frac{3x}{x-2} - \frac{x+1}{2x-4} = \frac{3x}{x-2} - \frac{x+1}{2(x-2)} = \frac{6x-1 \cdot (x+1)}{2(x-2)} = \frac{6x-x-1}{2(x-2)} = \frac{5x-1}{2(x-2)}$$

$$3) \quad \frac{n+2}{n+4} + \frac{n-3}{8+2n} = \frac{n+2}{n+4} + \frac{n-3}{2(4+n)} = \frac{2(n+2)+1 \cdot (n-3)}{2(4+n)} = \frac{2n+4+n-3}{2(4+n)} = \frac{3n+1}{2(4+n)}$$

$$4) \quad \frac{5}{x+2} - \frac{3-2x}{x^2+2x} = \frac{5}{x+2} - \frac{3-2x}{x(x+2)} = \frac{5x-1 \cdot (3-2x)}{x(x+2)} = \frac{5x-3+2x}{x(x+2)} = \frac{7x-3}{x(x+2)}$$

$$5) \quad \frac{x+2}{x-1} - \frac{x-3}{1-x} = \frac{x+2}{x-1} - \frac{x-3}{-1 \cdot (x-1)} = \frac{x+2}{x-1} + \frac{x-3}{x-1} = \frac{x+2+x-3}{x-1} = \frac{2x-1}{x-1}$$

$$6) \quad 1 - \frac{2x-1}{x+4} = \frac{x+4-1 \cdot (2x-1)}{x+4} = \frac{x+4-2x+1}{x+4} = \frac{5-x}{x+4}$$

$$7) \quad \frac{a+b}{a^2} + \frac{a-b}{ab} = \frac{b(a+b)+a(a-b)}{a^2b} = \frac{ab+b^2+a^2-ab}{a^2b} = \frac{a^2+b^2}{a^2b}$$

$$8) \quad 2a - \frac{a^2-3}{a} = \frac{2a^2-1 \cdot (a^2-3)}{a} = \frac{2a^2-a^2+3}{a} = \frac{a^2+3}{a}$$

$$9) \quad \frac{4-3a}{2+a} + 2 = \frac{4-3a+2(2+a)}{2+a} = \frac{4-3a+4+2a}{2+a} = \frac{8-a}{2+a}$$

$$10) \quad \frac{1-2x}{x^2+5x} + \frac{3}{5x+25} = \frac{1-2x}{x(x+5)} + \frac{3}{5(x+5)} = \frac{5(1-2x)+3x}{5x(x+5)} = \frac{5-10x+3x}{5x(x+5)} = \frac{5-7x}{5x(x+5)}$$

$$11) \quad \frac{3}{2a-3} - \frac{1-a}{4a^2-9} = \frac{3}{2a-3} - \frac{1-a}{(2a+3)(2a-3)} = \frac{3(2a+3)-1 \cdot (1-a)}{(2a+3)(2a-3)} = \\ = \frac{6a+9-1+a}{(2a+3)(2a-3)} = \frac{7a+8}{(2a+3)(2a-3)}$$

$$12) \quad \frac{a^2-b^2}{a+b} \cdot \frac{a}{2a-2b} = \frac{(a+b)(a-b)}{a+b} \cdot \frac{a}{2(a-b)} = \frac{a}{2}$$

$$13) \quad \frac{5}{x-y} \cdot (x^2-y^2) = \frac{5}{x-y} \cdot \frac{(x+y)(x-y)}{1} = 5(x+y)$$

$$14) \quad \frac{x+y}{x-y} \cdot \frac{(x-y)^2}{x^2-y^2} = \frac{x+y}{x-y} \cdot \frac{(x-y)(x-y)}{(x+y)(x-y)} = 1$$

$$15) \quad \left(\frac{x}{y} - \frac{y}{x} \right) \cdot \frac{xy}{x+y} = \frac{x^2-y^2}{xy} \cdot \frac{xy}{x+y} = \frac{(x+y)(x-y)}{xy} \cdot \frac{xy}{x+y} = x-y$$

$$16) \quad \left(\frac{a}{b} - 1 \right) \cdot \frac{2b}{a^2-b^2} = \frac{a-b}{b} \cdot \frac{2b}{(a+b)(a-b)} = \frac{2}{a+b}$$

$$17) \left(1 - \frac{n}{n+1}\right) \cdot \left(n - \frac{1}{n}\right) = \frac{n+1-n}{n+1} \cdot \frac{n^2-1}{n} = \frac{1}{n+1} \cdot \frac{(n+1)(n-1)}{n} = \frac{n-1}{n}$$

$$18) \frac{3}{c-1} - \frac{3}{c^2-c} = \frac{3}{c-1} - \frac{3}{c(c-1)} = \frac{3c-3}{c(c-1)} = \frac{3(c-1)}{c(c-1)} = \frac{3}{c}$$

$$19) \frac{a^2+ab}{a} : \frac{b}{ab+b^2} = \frac{a(a+b)}{a} : \frac{b}{b(a+b)} = \frac{a(a+b)}{a} \cdot \frac{b(a+b)}{b} = (a+b)^2$$

$$20) \left(u + \frac{u}{u-1}\right) : \left(1 + \frac{1}{u^2-1}\right) = \frac{u \cdot (u-1) + u}{u-1} : \frac{u^2-1+1}{u^2-1} = \frac{u^2}{u-1} \cdot \frac{u^2-1}{u^2} = \frac{1}{u-1} \cdot \frac{(u+1)(u-1)}{1} = u+1$$

$$21) \frac{\frac{1}{a+a^2}}{\frac{a-1}{a^2-1}} = \frac{1}{a(1+a)} : \frac{a-1}{(a+1)(a-1)} = \frac{1}{a(1+a)} \cdot \frac{(a+1)(a-1)}{a-1} = \frac{1}{a}$$

$$22) \frac{\frac{u+1}{1-u}}{\left(1 - \frac{u}{u-1}\right)} = \frac{u+1}{1-u} : \frac{u-1-u}{u-1} = \frac{u+1}{1-u} \cdot \frac{u-1}{-1} = \frac{u+1}{-1(u-1)} \cdot \frac{u-1}{-1} = u+1$$

$$23) \frac{\frac{x+y}{x-y}}{x^2-y^2} = \frac{x+y}{x-y} : \frac{x^2-y^2}{1} = \frac{x+y}{x-y} : \frac{(x+y)(x-y)}{1} = \frac{x+y}{x-y} \cdot \frac{1}{(x+y)(x-y)} = \frac{1}{(x-y)^2}$$

$$24) \frac{\frac{1-a}{a^2-1}}{1+a} = \frac{1-a}{1} : \frac{a^2-1}{1+a} = \frac{1-a}{1} \cdot \frac{1+a}{(a+1)(a-1)} = \frac{-1(a-1)}{1} \cdot \frac{1+a}{(a+1)(a-1)} = -1$$