Výrazy

- operace se zlomky
- vzorce
- rozklad na součin
- užití rozkladu kvadratického trojčlenu
- částečné odmocňování
- usměrňování zlomků
- mocniny a odmocniny

operace se zlomky

podmínky!

sčítání, odčítání – společný jmenovatel

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

$$\frac{1}{x-2}-\frac{4-x}{x^2-2x}$$

$$\frac{a-1}{a^2+a}-\frac{a-3}{a^2-1}-\frac{a+2}{2a^2+2a}$$

násobení, dělení

$$\frac{x}{x+3}*\frac{x^2-9}{3yx}$$

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

$$\frac{2x^2-2xy}{ab^2}\div\frac{4x^2-4y^2}{6a^2b}$$

$$\frac{\frac{1}{x}+\frac{1}{y}}{\frac{x+y}{xy}}$$

$$\left[\left(\frac{x}{y}-\frac{y}{x}\right)\div\left(\frac{x}{y}+\frac{y}{x}-2\right)\right]\div\left(1+\frac{y}{x}\right)$$

$$\left(b+\frac{a-b}{1+ab}\right)\div\left(1-\frac{b(a-b)}{1+ab}\right)$$

$$(x^3-x^2-x-15)\div(x-3)$$

$$(2x^3+3x^2+x+6)\div(x+2)=2x^2-x+3$$

$$(8x^4-16x^3+8x^2-7x+6)\div(2x-3)=4x^3-2x^2+x-2$$

vzorce

$(a \pm b)^2 = a^2 \pm 2ab + b^2$

$(a \pm b)^3 = a^3 \pm 3a^2b + 3ab^2 \pm b^3$

$a^2 - b^2 = (a-b)(a+b)$

$a^2 + b^2 =$ toto není vzorec

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

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

$$\frac{m^4 - n^4}{m^2 - 2mn + n^2} * \frac{m-n}{m^2 + mn}$$

$$\left(\frac{4x^3}{x^3 - y^3} \div \frac{2x^3}{x^2 - 2xy + y^2}\right) \cdot \frac{x^2 + xy + y^2}{x^2 - y^2}$$

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

rozklad na součin

- vytýkání
- vzorce
- dvojice

$27x^3 - 8y^3$

$2x^3 - 12x^2y^2 + 24xy^4 - 16y^6$

$x^2 - xy - 2x + 2y$

$$\frac{(a+b)^2 - (c+d)^2}{(a+c)^2 - (b+d)^2}$$

$$\frac{x^3 - 125}{x^3 - 15x^2 + 75x - 125}$$

$$\frac{x - xy + z - zy}{1 - 3y + 3y^3 - y^2}$$

$$\frac{x^3 - 2x^2 - x + 2}{x^3 + 2x^2 - x - 2}$$

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

užití rozkladu kvadratického trojčlenu

Součinový tvar a Vietovy vzorce:

$$ax^2 + bx + c = 0$$

$$a(x-r)(x-s) = 0$$

$$r + s = -\frac{b}{a} \qquad r \cdot s = \frac{c}{a}$$

$x^2 - 2x - 3$

$x^2 - 5x + 6$

$x^2 - 2x - 8$

$x^2 + 7x + 10$

$x^2 - x - 6$

$x^2 + x - 56$

$3x^2 - 18x + 15$

$$\left[\frac{4x}{x^2+4} \cdot \left(\frac{2}{x^2-2x} - \frac{x}{4-2x}\right) - \frac{4}{x^2-4}\right] : \frac{x}{x-2}$$

mocniny a odmocniny

pravidla:

$$a^0 = 1$$
$$a^{-n} = \frac{1}{a^n}$$
$$a^{\frac{r}{s}} = \sqrt[s]{a^r}$$
$$a^r . a^s = a^{r+s}$$
$$(a^r)^s = a^{r.s}$$
$$(a . b)^r = a^r . b^r$$
$$\left(\frac{a}{b}\right)^r = \frac{a^r}{b^r}$$
$$a^r : a^s = a^{r-s}$$

$$\sqrt[n]{a} . \sqrt[n]{b} = \sqrt[n]{ab}$$
$$\frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\frac{a}{b}}$$
$$\sqrt[m]{\sqrt[n]{a}} = \sqrt[mn]{a}$$
$$\left(\sqrt[n]{a}\right)^s = \sqrt[n]{a^s}$$
$$\sqrt[n]{a} = \sqrt[np]{a^p}$$
$$\sqrt[kn]{a^{km}} = \sqrt[n]{a^m}$$

částečné odmocňování

$$\sqrt{120} = \sqrt{4 * 30} = \sqrt{4} * \sqrt{30} = 2\sqrt{30}$$

$$\sqrt{200}$$
$$\sqrt{150}$$
$$\sqrt{1000}$$
$$\sqrt[3]{108}$$
$$\sqrt[3]{128}$$
$$\sqrt[3]{x^5 y^3 z^7}$$

$$\left(2\sqrt{3} + \sqrt{5}\right)^2 - 2\sqrt{60} - 17 = 0$$
$$\left(3 - 2\sqrt{2}\right)^2 - \left(-1 + 3\sqrt{2}\right) \cdot \sqrt{8} = 5 - 10\sqrt{2}$$
$$5\sqrt{20} - 3\sqrt{125} + 7\sqrt{45} + \sqrt{180} = 22\sqrt{5}$$

usměrňování zlomků

$$\frac{2}{\sqrt{3}}=\frac{2}{\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}}=\frac{2\sqrt{3}}{3}$$

$$\frac{2}{\sqrt{2}-\sqrt{5}}=\frac{2}{\sqrt{2}-\sqrt{5}}\cdot\frac{\sqrt{2}+\sqrt{5}}{\sqrt{2}+\sqrt{5}}=\frac{2\sqrt{2}+2\sqrt{5}}{2-5}=\frac{2\sqrt{2}+2\sqrt{5}}{-3}$$

$$\frac{2\sqrt{3}}{\sqrt{2}-3}=\frac{2\sqrt{3}}{\sqrt{2}-3}\cdot\frac{\sqrt{2}-3}{\sqrt{2}-3}=\frac{2\sqrt{6}-6\sqrt{3}}{2-9}=\frac{2\sqrt{6}-6\sqrt{3}}{-7}$$

$$\frac{2}{\sqrt{3}-\sqrt{4}}$$

$$\frac{ab}{3\sqrt{a^3b}}$$

$$\frac{\sqrt{ab}-a\sqrt{b}}{\sqrt{ab}}$$

$$\frac{2\sqrt{x}-\sqrt{2}x}{\sqrt{x}-\sqrt{2}}$$

$$\frac{\sqrt{2}-\sqrt{3}}{1-\sqrt{2}}+\frac{\sqrt{6}+\sqrt{2}}{\sqrt{3}-1}=\sqrt{2}+\sqrt{3}+2\sqrt{6}-2$$

Upravte:

a) $(3-2\sqrt{2})^2-(-1+3\sqrt{2})\sqrt{8}$, $[5-10\sqrt{2}]$

b) $(2\sqrt{3}+\sqrt{5})^2-2\sqrt{60}-17$, $[\,0\,]$

c) $\left(\frac{1+\sqrt{2}}{\sqrt{2}}-\frac{\sqrt{2}}{1-\sqrt{2}}\right)^2$, $\left[\frac{9(3+2\sqrt{2})}{2}\right]$

d) $\left(\frac{3-2\sqrt{2}}{3\sqrt{2}-4}\right)^2$. $\left[\,\frac{1}{2}\,\right]$

a) $f(a,b)=\left[a^{-\frac{3}{2}}b(ab^{-2})^{-\frac{1}{2}}(a^{-1})^{-\frac{2}{3}}\right]^3$ Vypočtěte: $f(\frac{\sqrt{2}}{2},\frac{1}{\sqrt[3]{2}})$ $[\,1\,]$

Zjednodušte:

a) $\dfrac{28a^{-3}b^4d^{-5}}{64ab^6c^{-2}} : \dfrac{7a^3b^{-2}c}{8a^2d^3}$ b) $(x \cdot x^{\frac{1}{3}})^{\frac{1}{2}} \cdot (x \cdot x^{\frac{1}{2}})^{\frac{1}{3}}$

$$\sqrt[5]{\frac{4}{\sqrt[3]{2}}} \div \sqrt[3]{\frac{2}{\sqrt[5]{8}}} = \sqrt[5]{2}$$

$$\frac{\left(10^{\frac{1}{3}} \cdot 8^{-\frac{1}{2}}\right)^{-3}}{\left(5^{\frac{1}{4}} \cdot 4^{\frac{1}{8}}\right)^{2}} \div \frac{\sqrt{2\sqrt[3]{4}}}{\sqrt[3]{2\sqrt[4]{4}}} = \frac{4\sqrt[3]{4}\sqrt{5}}{25}$$

$$\frac{\sqrt{\sqrt[3]{a} \cdot a}}{\sqrt[3]{\left(\sqrt{a} \cdot \frac{1}{a^2}\right)^2}} = a\sqrt[3]{a^2}$$

$$\left[(a^{0,5} + b^{0,5})^2 - \left(\frac{\sqrt{a} - \sqrt{b}}{a^{1,5} - b^{1,5}}\right)^{-1}\right] \cdot (ab)^{-0,5}$$

$$1 + \frac{(4-a^2)^{-\frac{1}{2}} - (2-a)^{-\frac{1}{2}}}{(2+a)^{-\frac{1}{2}} - (4-a^2)^{-\frac{1}{2}}} \cdot \frac{1-a}{1-\sqrt{2-a}}$$

$$\left(\frac{x^{-2} - x^{-4}}{x^{-2} - 1}\right) : \left(\frac{1 - x^{-\frac{1}{2}}}{x^{-\frac{1}{2}} - x^{-1}}\right)$$

Zjednodušte výrazy a výsledek zapište ve tvaru odmocniny:

a) $\left(\frac{a\sqrt{a}+b\sqrt{b}}{\sqrt{a}+\sqrt{b}} - \sqrt{ab}\right) : (a-b) + \frac{2\sqrt{b}}{\sqrt{a}+\sqrt{b}}$, [1; $a \geq 0 \wedge b \geq 0 \wedge a \neq b$]

b) $\sqrt{a\sqrt[3]{b^{-1}}} : \sqrt[3]{b^2\sqrt{a}} + \sqrt[6]{b} : b$, [$\frac{1+\sqrt[3]{a}}{\sqrt[6]{b^5}}$; $a > 0 \wedge b > 0$]

c) $\sqrt[4]{a^3} \cdot \sqrt[3]{a^2} \cdot \sqrt{a}$, [$\sqrt[12]{a^{23}}$; $a \geq 0$]

d) $\sqrt{x\sqrt[3]{x}} \cdot \sqrt[3]{x\sqrt{x}}$, [$\sqrt[6]{x^7}$; $x \geq 0$]

e) $\sqrt[5]{\left(\frac{\sqrt{m} \cdot m^{-2}}{m^{\frac{1}{3}}}\right)^{-2}}$, [$\sqrt[15]{m^{11}}$; $m > 0$]

f) $\frac{\sqrt[3]{a^{-2}}\sqrt{a^3}}{\sqrt[3]{\sqrt{a^4}\sqrt{a^{-3}}}}$, [$\sqrt[3]{a^5}$; $a > 0$]

g) $\sqrt{ab} \cdot \sqrt[3]{4a^2b^4} \cdot \sqrt[4]{8a^3b^7} \cdot \sqrt[12]{2a^3b^9}$, [$\sqrt{2^3}\sqrt[6]{a^{13}b^{26}}$; $a \geq 0 \wedge b \geq 0$]

h) $\sqrt{\frac{a}{b}\sqrt[3]{\frac{a^2}{b^2}\sqrt[4]{\frac{a^3}{b^3}}}}$. [$\sqrt[24]{\left(\frac{a}{b}\right)^{29}}$; $a \geq 0 \wedge b > 0$]