M9

1

Milí deváťáci, posílám další práci, ale je mi jasné, že každý dojdete – někdo výš, někdo středně, .... atd.
Snažte se psát si do sešitu vše!

Práce je na celý týden! 2. 11. – 6. 11.

.... stále sčítání a odčítání lomených výrazů

87. str. sb.

39/5

$y \neq 0$
$y \neq -2$

Pozor, ve sbírce je VE VÝSLEDKU chyba!

a) $$\frac{2}{y} + \frac{y}{y+2} = \frac{2\cdot(y+2)+y^2}{y\cdot(y+2)} = \frac{2y+4+y^2}{y\cdot(y+2)}$$

mínus nechat, nerozepsané

b) $$\frac{y}{y-2} - \frac{2}{y} = \frac{y^2-2\cdot(y-2)}{(y-2)\cdot y} = \frac{y^2-2y+4}{(y-2)\cdot y}$$ $y \neq 0$, $y \neq 2$

c) $$\frac{1}{y+2} + \frac{y}{2\cdot(2+y)} = \frac{\cancel{(2+y)}}{2\cdot\cancel{(y+2)}} = \frac{1}{2}$$ $y \neq -2$

d) $$\frac{y+1}{4\cdot(y-3)} - \frac{y+2}{5\cdot(y-3)} = \frac{5\cdot(y+1)-4\cdot(y+2)}{20\cdot(y-3)} =$$

$$= \frac{5y+5-4y-8}{20\cdot(y-3)} = \frac{\cancel{(y-3)}}{20\cdot\cancel{(y-3)}} = \frac{1}{20}$$ $y \neq 3$

30/6 .... ověřovat pro $k = -1$ NEBUDEME

a) $$\frac{1+k}{k-1} - \frac{k-2}{-1+k} = \frac{1+k-(k-2)}{k-1} =$$ „kosmetika“

$$= \frac{1+k-k+2}{k-1} = \frac{3}{k-1}$$ $k \neq 1$

b) $\frac{r-5}{r-3} \mp \frac{r+5}{-3+r} = \frac{r-5-(r+5)}{r-3} = \frac{r-5-r-5}{r-3} =$

„kouťák"

$= -\frac{10}{r-3} \qquad r \neq 3$

c) $\frac{1+r}{r-1} \mp \frac{r+3}{2\cdot(-1+r)} = \frac{2\cdot(1+r)-(r+3)}{2\cdot(r-1)} =$

„kouťák"

$= \frac{2+2r-r-3}{2\cdot(r-1)} = \frac{\cancel{(r-1)}}{2\cdot\cancel{(r-1)}} = \frac{1}{2} \qquad r \neq 1$

d) $\frac{2r-1}{2\cdot(r-3)} \mp \frac{3r-2}{3\cdot(-3+r)} = \frac{3\cdot(2r-1)-2\cdot(3r-2)}{6\cdot(r-3)} =$

„kouťák"

$= \frac{6r-3-6r+4}{6\cdot(r-3)} = \frac{1}{6\cdot(r-3)} \qquad r \neq 3$

40/7

a) $\frac{r}{r+s} + \frac{s}{r+s} = \frac{r+s}{r+s} = \frac{1}{1} = 1 \qquad r \neq -s$

nebo $s \neq -r$

– stejná podmínka

b) $\frac{2s}{r-s} - \frac{2r}{r-s} = \frac{2s-2r}{r-s} = -\frac{2\cdot\cancel{(s-r)}}{\cancel{-r+s}} = -2 \qquad s \neq r$

„kouťák"

c) $\frac{3s}{2r+s} + \frac{6r}{s+2r} = \frac{3s+6r}{s+2r} = \frac{3\cdot\cancel{(s+2r)}}{\cancel{s+2r}} =$

$= 3 \qquad s \neq -2r$

nebo $r \neq -\frac{s}{2}$

– stejná podmínka

Mg

3

vzorec!

d) $\dfrac{r^2+s^2}{r-s} \overset{-}{+} \dfrac{2rs}{-s+r} = \dfrac{r^2+s^2-2rs}{r-s} = \dfrac{(r-s)^{\cancel{2}}}{\cancel{r-s}} =$ „kosmeťák"

$= r-s \qquad r \neq s$

vzorec!

e) $\dfrac{r^2}{s\cdot(r-s)} \overset{-}{+} \dfrac{s}{-s+r} = \dfrac{r^2-s^2}{s\cdot(r-s)} =$ „kosmeťák"

$= \dfrac{(r+s)\cdot\cancel{(r-s)}}{s\cdot\cancel{(r-s)}} = \dfrac{r+s}{s} \qquad s \neq 0 \quad r \neq s$

f) $\dfrac{r}{5\cdot(2r-5s)} \overset{-}{+} \dfrac{s}{2\cdot(-5s+2r)} = \dfrac{\cancel{2r-5s}}{10\cdot\cancel{(2r-5s)}} = \dfrac{1}{10} \qquad r \neq \dfrac{5s}{2}$ „kosmeťák"

(nebo $s \neq \dfrac{2r}{5}$)

40/8

a) $\dfrac{a-4}{a-5} + \dfrac{a-3}{10-2a} = \dfrac{a-4}{a-5} \overset{-}{+} \dfrac{a-3}{2(-5+a)} = \dfrac{2\cdot(a-4)-(a-3)}{2\cdot(a-5)} =$

vytkneme a „kosmeťák"

$= \dfrac{2a-8-a+3}{2\cdot(a-5)} = \dfrac{\cancel{a-5}}{2\cdot\cancel{(a-5)}} = \dfrac{1}{2} \qquad a \neq 5$

b) $\dfrac{3-2a}{3a-a^2} + \dfrac{a-6}{3a-9} = \dfrac{3-2a}{a\cdot(3-a)} \overset{-}{+} \dfrac{a-6}{3\cdot(-a+3)} =$

vytkneme vytkneme „kosmeťák"

$= \dfrac{3\cdot(3-2a)-a\cdot(a-6)}{3\cdot a\cdot(3-a)} = \dfrac{9-6a-a^2+6a}{3a(3-a)} =$

vzorec!

$= \dfrac{9-a^2}{3a(3-a)} = \dfrac{\cancel{(3-a)}\cdot(3+a)}{3a\cdot\cancel{(3-a)}} = \dfrac{3+a}{3a} \qquad a \neq 0 \quad a \neq 3$

Už je to moc, že, ale je to pořád dokola .... ☺

c) $$\frac{5a-3}{ab-a^2} + \frac{5b-3}{ab-b^2} = \frac{5a-3}{a\cdot(b-a)} \overset{-}{+} \frac{5b-3}{b\cdot(-a+b)} =$$

vytkneme   vytkneme   „kosmeťák"

$$= \frac{b\cdot(5a-3) - a\cdot(5b-3)}{a\cdot b\cdot(b-a)} = \frac{5ab-3b-5ab+3a}{a\cdot b\cdot(b-a)} =$$

$$= \frac{3a-3b}{a\cdot b\cdot(b-a)} = -\frac{3\cdot(\cancel{a-b})}{a\cdot b\cdot\cancel{(-b+a)}} = -\frac{3}{a\cdot b}$$

$a \neq 0$
$b \neq 0$
$a \neq b$

„kosmeťák" podruhé!

d) $$\frac{3a-2}{2ab-a^2} + \frac{3b-1}{ab-2b^2} = \frac{3a-2}{a\cdot(2b-a)} \overset{-}{+} \frac{3b-1}{b\cdot(-a+2b)} =$$

vytkneme   vytkneme   „kosmeťák"

$$= \frac{b\cdot(3a-2) - a\cdot(3b-1)}{a\cdot b\cdot(2b-a)} = \frac{3ab-2b-3ab+a}{a\cdot b\cdot(2b-a)} =$$

$$= -\frac{\cancel{a-2b}}{a\cdot b\cdot\cancel{(-2b+a)}} = -\frac{1}{a\cdot b}$$

$a \neq 0$
$b \neq 0$
$a \neq 2b$

„kosmeťák" podruhé!

40/9

a) $$\frac{1}{x-3} - \frac{3}{2x-6} + \frac{5}{3x-9} =$$

$$= \frac{1}{x-3} - \frac{3}{2\cdot(x-3)} + \frac{5}{3\cdot(x-3)} = \frac{6-9+10}{6\cdot(x-3)} =$$

$$= \frac{7}{6\cdot(x-3)} \qquad x \neq 3$$

$x \neq -2$

b) $$\frac{x}{x+2} - \frac{4x}{10+5x} + \frac{2x}{3x+6} = \frac{15x-12x+10x}{15\cdot(x+2)} = \frac{13x}{15(x+2)}$$

$10+5x = 5\cdot(2+x)$, $3x+6 = 3\cdot(x+2)$

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

$x\cdot(x-y)$

$= \frac{2\cdot\cancel{(x-y)}}{x\cdot\cancel{(x-y)}} = \frac{2}{x}$ $\quad x \neq 0$, $\; x \neq y$

d) $\frac{1}{x^2-x} - \frac{1}{x-1} - \frac{1}{x} = \frac{1-x-(x-1)}{x\cdot(x-1)} =$ !

$x\cdot(x-1)$

$= \frac{1-x-x+1}{x\cdot(x-1)} = \frac{2-2x}{x\cdot(x-1)} = -\frac{2\cdot\cancel{(1-x)}}{x\cdot\cancel{(-x+1)}} = -\frac{2}{x}$ $\quad x \neq 0$, $\; x \neq 1$

„kouťák"

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

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

$= \frac{4+2x}{(x+2)\cdot(x-2)} = \frac{2\cdot\cancel{(2+x)}}{\cancel{(x+2)}(x-2)} = \frac{2}{x-2}$ $\quad x \neq 2$, $\; x \neq -2$

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

$(x+y)\cdot(x-y)$

$= \frac{2x-2y}{(x+y)(x-y)} = \frac{2\cdot\cancel{(x-y)}}{(x+y)\cdot\cancel{(x-y)}} = \frac{2}{x+y}$ $\quad x \neq y$, $\; x \neq -y$

40/10

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

$r\cdot(r-1)$ „kouťák"

$\frac{3\cdot\cancel{(r-1)}}{r\cdot\cancel{(r-1)}} = \frac{3}{r}$ $\quad r \neq 0$, $\; r \neq 1$

b) $\dfrac{x}{\underset{x\cdot(x+1)}{x^2+x}} + \dfrac{1}{\underset{x\cdot(x-1)}{x^2-x}} = \dfrac{x\cdot(x-1)+x+1}{x\cdot(x+1)\cdot(x-1)} =$

$= \dfrac{x^2-x+x+1}{x\cdot(x+1)\cdot(x-1)} = \dfrac{x^2+1}{x\cdot(x^2-1)}$ $\quad x\neq 0$, $x\neq 1$, $x\neq -1$

c) $\dfrac{x}{\underset{(x-1)\cdot(x+1)}{x^2-1}} - \dfrac{x}{(x-1)^2} = \dfrac{x\cdot(x-1)-x\cdot(x+1)}{(x-1)^2\cdot(x+1)} = \dfrac{x^2-x-x^2-x}{(x-1)^2\cdot(x+1)} =$

$= -\dfrac{2x}{(x-1)^2\cdot(x+1)}$ $\quad x\neq 1$, $x\neq -1$

ve výsledcích $-\dfrac{2x}{(x-1)\cdot(x^2-1)}$ (!) je to samé!

d) $\dfrac{x^2+x}{\underset{(x+1)\cdot(x-1)}{x^2-1}} \mp \dfrac{1}{-1+x} = \dfrac{x^2+x-(x+1)!}{(x+1)\cdot(x-1)} =$

„konečták"

$= \dfrac{x^2+x-x-1}{(x+1)\cdot(x-1)} = \dfrac{x^2-1}{(x+1)\cdot(x-1)} = \dfrac{\cancel{(x+1)}\cancel{(x-1)}}{\cancel{(x+1)}\cdot\cancel{(x-1)}} = \dfrac{1}{1} = 1$ $\quad x\neq 1$, $x\neq -1$

41/11

b) $\dfrac{2}{p+4} \mp \dfrac{2}{-4+p} + \dfrac{p^2}{\underset{(p+4)\cdot(p-4)}{p^2-16}} =$

„konečták"

$= \dfrac{2\cdot(p-4)-2\cdot(p+4)+p^2}{(p+4)\cdot(p-4)} = \dfrac{2p-8-2p-8+p^2}{(p+4)\cdot(p-4)} =$

$= \dfrac{p^2-16}{(p+4)(p-4)} = \dfrac{\cancel{(p+4)}\cancel{(p-4)}}{\cancel{(p+4)}\cdot\cancel{(p-4)}} = \dfrac{1}{1} = 1$ $\quad p\neq 4$, $p\neq -4$