MÁRIA MATÚŠEKOVÁ

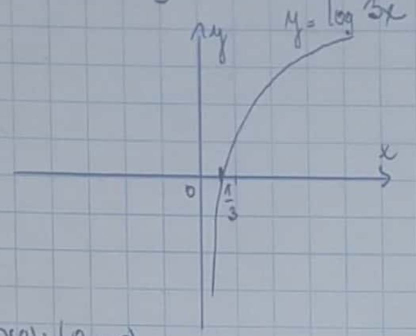
Domáca úloha číslo 04 - logaritmická f., log. rovnice/nerovnice

1) a) f: $y = \log 3x$

$\log 3x = 0$

$3x = 10^0$

$x = \frac{1}{3}$



- $D(f): (0, \infty)$
- $H(f) = R$
- parita: $f(-x) = \log 3(-x) = \log -3x$

$\cancel{\log -3x}$ $-3x = 10^0$

$x = -\frac{1}{3}$

nie je párna, nie je nepárna

- prostosť: je prostá => ∃! inverzná
- ohraničenosť: nie je ohraničená
- monotónnosť: je rastúca

$x_1 < x_2$

$3x_1 < 3x_2$

$\log x_1 < \log x_2$

$\cancel{\log x}$ $f(x_1) < f(x_2)$

- spojitosť: je spojitá
- súradnice priesečníkov s [0,0]

$P_x = [x, 0]$ $0 = \log 3x$ podm.: $x > 0$ $3x = 1$ $x = \frac{1}{3}$

$P_y = [0, y]$ $y = \log 3.0$ $\emptyset$

- periodickosť: nie je periodická
- extrémy: nemá

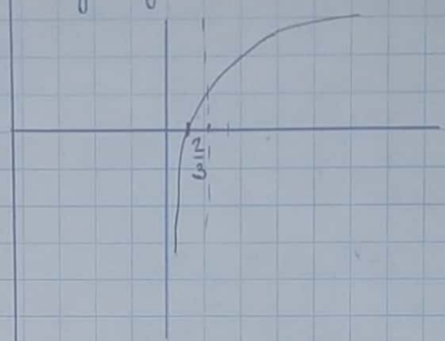
$y = \log_a x$ $a \in R^+ - \{1\}$

$a > 1$ $0 < a < 1$

b) $y = \log(3x-1)$ $\log 3x - 1 = 0$ $3x - 1 = 1$ $3x = 2$ $x = \frac{2}{3}$

podm.: $x > \frac{1}{3}$

$x \in (\frac{1}{3}, \infty)$



- $D(f) = (\frac{1}{3}, \infty)$
- $H(f) = R$

$-3x = 1$

- parita: $f(-x) = \log(-3x-1) = -\frac{1}{3}$

nie je ani párna, ani nepárna

- prostosť: je prostá => ∃! inverzná
- ohraničenosť: nie je ohraničená
- monotónnosť: je rastúca

$x_1 < x_2$

$3x_1 < 3x_2$

$3x_1 - 1 < 3x_2 - 1$

$\log 3x_1 - 1 < \log 3x_2 - 1$

$f(x_1) < f(x_2)$

- spojitosť: je spojitá
- súradnice priesečníkov s [0,0]

$P_x = [x, 0]$ $x = \frac{2}{3}$

$P_y = [0, y]$ $\emptyset$

- periodickosť: nie je periodická
- extrémy: nemá

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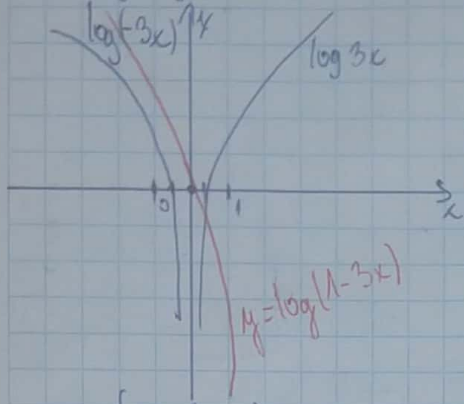
c) $f: y = \log(1-3x)$ $-(3x+1)$



- $D(f) = (-\infty, \frac{1}{3})$
- $H(f) = R$
- spojitosť: je spojitá
- prostosť: je prostá
  $\Rightarrow \exists!$ inverzná
- ohraničenosť: nie je ohraničená
- párnosť: $f(-x) =$ $= -\log(1+3x) = \frac{2}{3}$

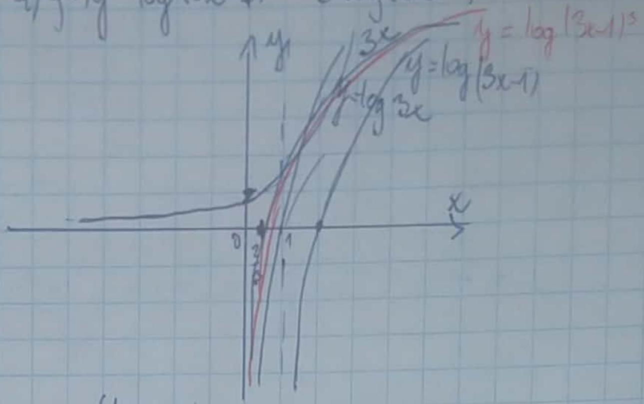
OR: $1+3x>0$, $x>-\frac{1}{3}$, $x \in R$; $1+3x=1$, $3x$

nie je párna, nie je nepárna

- súradnice s osou $1-3x=1$, $x=0$
  $P_x = [x, 0]$ $0 = \log(1-3x)$ $x = 0$
  $P_y = [0, y]$ $y = \log(1-3 \cdot 0)$ $y = 0$
  $\log_{10}(1)$ pri akomkoľvek základe $= 0$
- extrémy: nemá
- monotónnosť:
  $x_1 < x_2$
  $-3x_1 > -3x_2$
  $\log(1-3x_1) > \log(1-3x_2)$
  je klesajúca
- nie je periodická

OR: $x > \frac{1}{3}$

d) $f: y = \log(3x-1)^3$ $3\log(3x-1)$ $y = 3^x$ $(3x-1)^3 = 1$ $|\sqrt[3]{\ }$ $3x-1=1$ $x = \frac{2}{3}$



- $D(f) = (\frac{1}{3}, \infty)$
- $H(f) = R$
- spojitosť: je spojitá
- prostosť: je prostá
  $\Rightarrow \exists!$ inverzná
- ohraničenosť: nie je ohraničená
- párnosť: $f(-x) = -\log(-3x-1)^3$
  nie je párna, nie je nepárna
- súradnice s osou $[0, 0]$
  $P_x = [x, 0]$ $0 = \log(3x-1)^3$ $x = \frac{2}{3}$
  $P_y = [0, y]$ $y = \log(3 \cdot 0 - 1)^3$ $\emptyset$
- extrémy: nemá
- monotónnosť: je rastúca
  $x_1 < x_2$
  $3x_1 < 3x_2$
  $3x_1 - 1 < 3x_2 - 1$
  $\log(3x_1-1) < \log(3x_2-1)$
  $3\log(3x_1-1) < 3\log(3x_2-1)$
- periodickosť: nie je periodická

Matušisk

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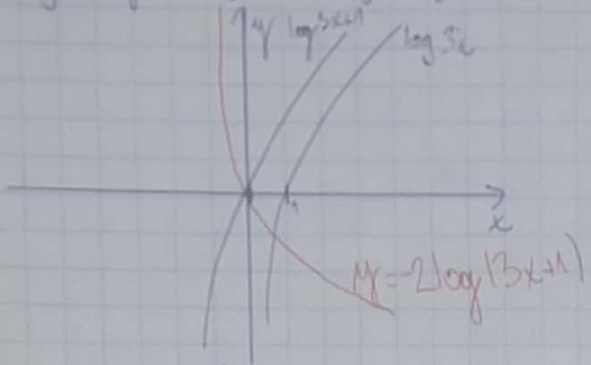
f) $f: y = -2\log(3x+1)$ $\quad y = \log\frac{1}{(3x+1)^2}$



- $D(f): (3x+1)^2 > 0$ $\quad$ - $D(f) = (-\frac{1}{3}, \infty)$

$3x > -1$ $\quad$ - $H(f) = R$

$x > -\frac{1}{3}$ $\quad$ - spojitosť: je spojitá

$x \in (-\frac{1}{3}, \infty)$

- prostosť: je prostá $\Rightarrow \exists!$ inverzná
- ohraničenosť: nie je ohraničená
- párnosť: nie je párna, nie je nepárna
- súradnice s osou $(0,0)$

$P(x) = [x, 0]$ $\quad y = -2\log(3x+1)$

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

$(3x+1)^2 = 1$

$9x^2 + 6x + \cancel{1} = \cancel{1}$

$3x(3x+2) = 0$

$x = 0 \wedge \cancel{x = -\frac{2}{3}}$

$P_y = [0, y]$ $\quad y = -2\log(3.0+1)$

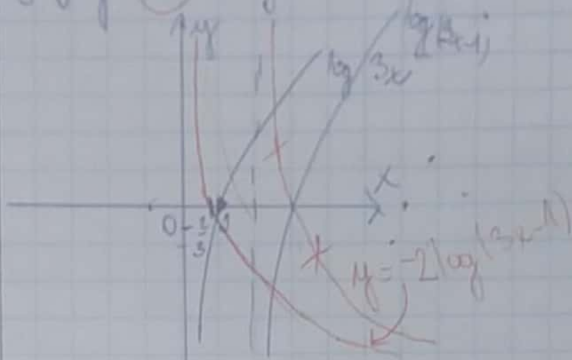
$y = -2.0 = 0$

- extrémy: nemá
- monotónnosť: je klesajúca
- periodickosť: nie je periodická

$\to x_1 < x_2$ $\quad (3x_1+1)^2 < (3x_2+1)^2$

$3x_1+1 < 3x_2+1$ $\quad \log\frac{1}{(3x_1+1)^2} > \log\frac{1}{(3x_2+1)^2}$

g) $f: y = -2\log(3x-1)$



- $D(f): 3x-1 > 0$ $\quad$ 2. $(3x-1)^2 = 1$ $\quad 3x(3x-2) = 0$

$x > \frac{1}{3}$ $\quad \frac{1}{(3x-1)^2} = 1$ $\quad x = 0 \wedge x = \frac{2}{3}$

$x \in (\frac{1}{3}, \infty)$ $\quad 1 = 9x^2 - 6x + 1$

- $D(f) = (\frac{1}{3}, \infty)$
- $H(f) = R$
- prostosť: je prostá $\Rightarrow \exists!$ inverzná
- ohraničenosť: nie je ohraničená
- spojitosť: je spojitá
- párnosť: ani párna, ani nepárna
- súradnice s osou $(0,0)$

$P_x = \frac{2}{3}$

$P_y = \emptyset$

- extrémy: nemá
- monotónnosť: klesajúca

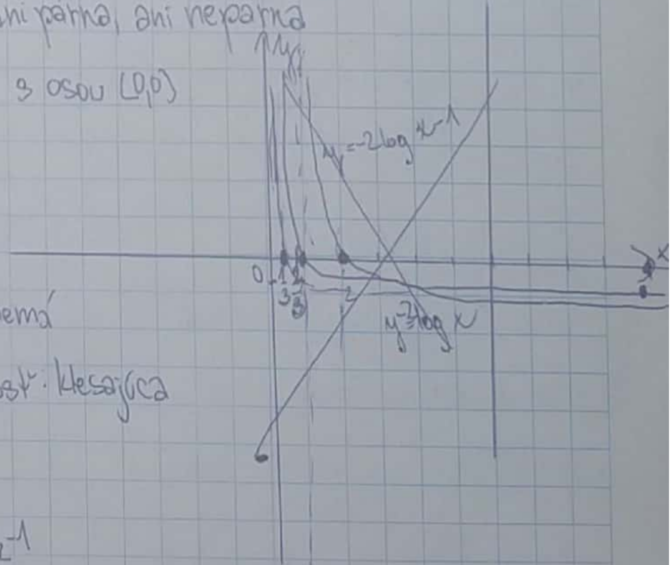
$x_1 < x_2$

$3x_1 - 1 < 3x_2 - 1$

$-2\log(3x_1-1) > -2\log(3x_2-1)$

$f(x_1) > f(x_2)$

- periodickosť: nie je periodická



$-2y = \log 3x$ $\quad 10^{-2y} = 3x$

$\frac{y}{-2} = \frac{-2\log(3x-1)}{-2}$

$-2y = \log(3x-1)$

$10^{-2y} = 3x-1$

x	y
1	0
10	$-\frac{1}{2}$

$3x - 1$

$x = \frac{1}{3}$

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$y = -\frac{1}{2}\log x \qquad \frac{y}{-\frac{1}{2}} = \frac{-\frac{1}{2}\log x}{-\frac{1}{2}} \qquad -2y = \log x \qquad y = -\frac{1}{2}$

$10^{-2y} = 10^{1}$

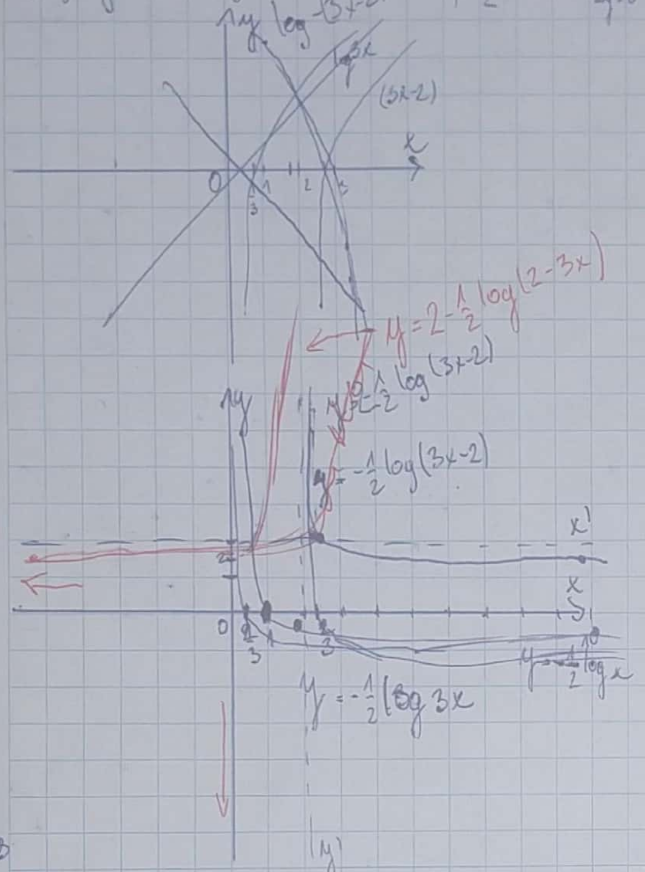
x	y
1	0
10	$-\frac{1}{2}$

$10^{-2y} = x$

$10^{-2y} = 1$

$-2y = 0$

g) $f: y = 2 - \frac{1}{2}\log(2-3x)$



$P_y = [0, y] =$

$y = 2 - \frac{1}{2}\log(2-3.0)$

$y = 2 - \frac{1}{2}\log 2$

$y = 1{,}84$

- extrémy: nemá
- monotónnosť: je rastúca
- ~~pen~~ $x_1 < x_2$

$-3x_1 > -3x_2$

$2-3x_1 > 2-3x_2$

$\log 2-3x_1 > \log 2-3x_2$

$-\frac{1}{2}\log 2-3x_1 < -\frac{1}{2}\log 2-3x_1$

$2-\frac{1}{2}\log(2-3x_1) < 2-\frac{1}{2}\log(2-3x_1)$

$f(x_1) < f(x_2)$

- periodickosť: nie je periodická

- $D(f) =$ 1) $2-3x > 0$

$x < \frac{2}{3}$

$x \in (-\infty, \frac{2}{3})$

- $H(f) = R$
- spojitosť: je spojitá
- prostosť: je prostá $\Rightarrow \exists$ inverzná
- ohran.: je ohraničená
- párnosť: nie je párna, ani nepárna
- súradnice s osou $[0,0]$ OR: $x < \frac{2}{3}$

$P_x = [x, 0] \quad 0 = 2 - \frac{1}{2}\log(2-3x)$

$-2 = -\frac{1}{2}\log(2-3x)$

$4 = \log(2-3x)$

$10^4 = 2-3x$

$10000 = 2-3x$

$-3x = 10000-2$

$-3x = 9998$

$x = \frac{9998}{-3}$

$\log 2x = \log 1$ $\quad \frac{y}{2} = \frac{\frac{1}{2}\log x}{\frac{1}{2}}$ $\quad 2y = \log x$

$2x = 1$ $\quad 10^{2y} = x$

$x = \frac{1}{2}$

x	y
1	0
10	$\frac{1}{2}$

$\log_2(x) = \frac{\ln(x)}{\ln(2)}$

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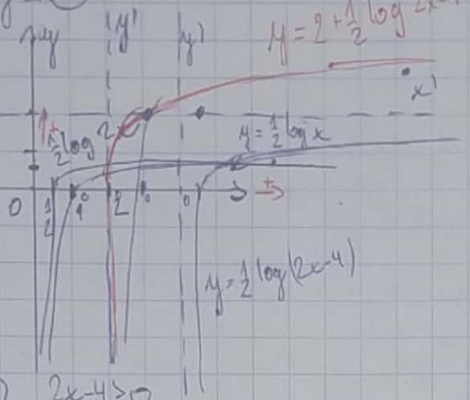
h) $f: y = 2 + \log\sqrt{2x-4}$ $\quad 2(x-2)$

$y = 2 + \frac{1}{2}\log 2x-4$



$-D(f)$: $2x-4>0$ $\quad 2x-4 \geq 0$

$2x > 4$ $\quad x \in (2,\infty)$

$x > 2$

$x \in (2,\infty)$

$D(f) = \langle 2,\infty)$

$H(f) = R$

- spojitosť: je spojitá
- parita: ani párna, ani nepárna
- prostosť: je prostá $\Rightarrow \exists!$ inverzná
- periodickosť: nie je periodická
- súradnice s osou $[0,0]$

$P_x = [x,0]$ $\quad 0 = 2 + \frac{1}{2}\log 2(x-2)$

~~$0 \ominus 2 - 2 = \frac{1}{2}\log 2 \frac{1}{2}\log(x-2)$~~

OP: $x>2$

$-4 = \log 2 + \log(x-2)$

$-4 - \log(x-2) = \log 2$

$\log(10)^{-4} - \log(x-2) = \log 2$

$\log\frac{(10)^{-4}}{x-2} = \log 2$

$\frac{1}{10^4(x-2)} = 2$

$\frac{1}{10000x - 20000} = 2$

$40000 1 = 20000x$

$x = \frac{400001}{\ldots} \doteq 2{,}0$

$P_y = [0,y]$

$\emptyset$

- monotónnosť:

$x_1 < x_2$

$2(x_1-2) < 2(x_2-2)$

$\frac{1}{2}\log 2(x_1-2) < \frac{1}{2}\log 2(x_2-2)$

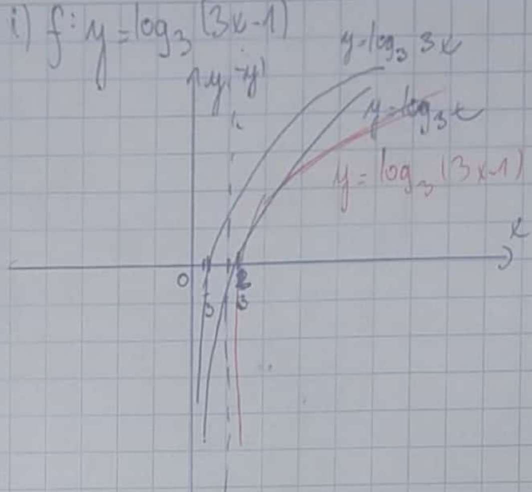
$2 + \frac{1}{2}\log 2(x_1-2) < 2 + \frac{1}{2}\log 2(x_2-2)$

$f(x_1) < f(x_2)$

rastúca

- extrémy: nemá
- ohraničenosť: nie je ohraničená

i) $f: y = \log_3(3x-1)$



$-D(f)$: $3x > 1$

$x > \frac{1}{3}$

$x \in (\frac{1}{3},\infty)$

$\frac{1}{3}$ $\quad \frac{2}{3}$

$-H(f) = R$

- súradnice s osou $[0,0]$

$P_x = [x,0]$ $\quad P_y[0,y]$

$0 = \log_3(3x-1)$ $\quad y = \log_3(-1)$

$1 = 3x-1$ $\quad \emptyset$

$2 = 3x$

$x = \frac{2}{3}$

- periodickosť: nie je periodická
- spojitosť: je spojitá
- parita: ani párna, ani nepárna
- prostosť: je prostá $\Rightarrow \exists!$ inverzná
- extrémy: nemá
- ohraničenosť: nie je ohraničená
- monotónnosť: rastúca

$x_1 < x_2$

$3x_1 - 1 < 3x_2 - 1$

$\log_3(3x_1-1) < \log_3(3x_2-1)$

$f(x_1) < f(x_2)$

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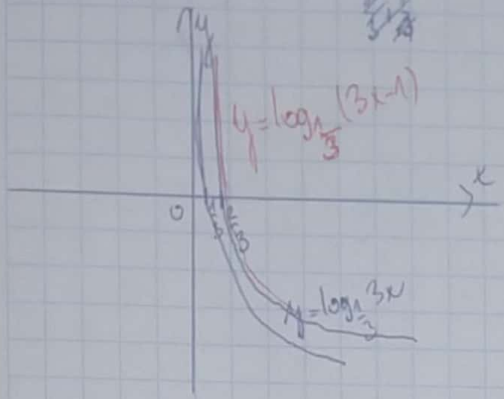
$0<a<1$

j) $f: y=\log_{\frac{1}{3}}(3x-1)$



$D(f): 3x-1>0$

$x>\frac{1}{3}$

- $D(f)=(\frac{1}{3},\infty)$
- $H(f)=R$
- spojitosť: je spojitá
- parita: ani párna, ani nepárna
- prostosť: je prostá ⇒ $\exists$ inverzná
- ohraničenosť: nie je ohraničená
- monotónnosť: klesajúca

$x_1<x_2$

$3x_1-1<3x_2-1$

$\log_{\frac{1}{3}}(3x_1-1)>\log_{\frac{1}{3}}(3x_2-1)$

$f(x_1)>f(x_2)$

- súradnice s osou $[0,0]$

$P_x=[x,0]$ $0=\log_{\frac{1}{3}}(3x-1)$

$1=3x-1$

$x=\frac{2}{3}$

$P_y=[0,y]$ $\emptyset$

*dopočítať (L)-(r)

- periodickosť: nie je periodická
- extrémy: nemá

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2) $x\in R$

$\log_a b \Leftrightarrow a^b=x$ $\quad a^{f(x)}=b$

$a\in R^+-\{1\}$ $\quad x\in R^+$ $\quad b\in R$

a) $\log_3\log_4\log_5 x=0$

$\log_3\log_4\log_5 x=\log_3 1$

$\log_4\log_5 x=1$

$\log_5 x=4^1$

$x=5^4$

$x=625$

$L=\{625\}$

OR: ~~$x>0$~~ $\quad x\leq 0$

~~$x\in(0,\infty)$~~

$\log_5 x\leq 0$

$x\leq 1$

$\log_4(\log_5 x)\leq 0$

$\log_5 x\leq 1$

~~$x\leq 5$~~

0 1 5

$x\in(-\infty,5\rangle$

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b) $\log_4\log_3\log_2 x=\frac{1}{2}$

$\log_4\log_3\log_2 x=\log_4 4^{\frac{1}{2}}$

$\log_3\log_2 x=2$

$\log_2 x=9$

$x=512$

$L=\{512\}$

OR: $x\leq 0$

$\log_2 x\leq 0$

$x\leq 1$

$\log_3(\log_2 x)\leq 0$

$\log_2 x\leq 1$

$x\leq 2$

$x\in(-\infty,2\rangle$

$x\in\langle 2,\infty)$

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c) $\log_{\frac{1}{2}}\log_3(1+20\log_2 x)=-2$

$\log_3(1+20\log_2 x)=(\frac{1}{2})^{-2}$

$\log_3(1+20\log_2 x)=4$

$1+20\log_2 x=81$

$20\log_2 x=80$

$\log_2 x=4$

$x=16$

$L=\{16\}$

OR: $x\leq 0$

$\log_3 1+20\log_2 x\leq 0$

$20\log_2 x\leq -1$

$\log_2 x\leq -\frac{1}{20}$

$x\leq 2^{(-\frac{1}{20})}$

$\log_3(1+20\log_2 x)\leq 0$

$1+20\log_2 x\leq 1$

$20\log_2 x\leq 0$

$x\leq 1$

$x\in(-\infty,1\rangle$

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d) $\log_2[14+2\log_7(1+2\log_{\frac{1}{2}}x)]=4$

$[14+2\log_7(1+2\log_{\frac{1}{2}}x)]=16$

$2\log_7(1+2\log_{\frac{1}{2}}x)=2$

$\log_7(1+2\log_{\frac{1}{2}}x)=1$

$1+2\log_{\frac{1}{2}}x=7$

$2\log_{\frac{1}{2}}x=6$

$\log_{\frac{1}{2}}x=3$

$x=\frac{1}{8}$

$K=\{\frac{1}{8}\}$

OR: 1) $x\le 0$

2) $1+2\log_{\frac{1}{2}}x\le 0$

$2\log_{\frac{1}{2}}x\le -1$

$\log_{\frac{1}{2}}x\le -\frac{1}{2}$

$x\le (\frac{1}{2})^{-\frac{1}{2}}$

$x\le\sqrt{2}$

3) $14+2\log_7(1+2\log_{\frac{1}{2}}x)\le 0$

$2\log_7(1+2\log_{\frac{1}{2}}x)\le -14$

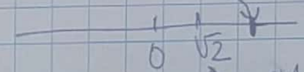
$\log_7(1+2\log_{\frac{1}{2}}x)\le -7$

$1+2\log_{\frac{1}{2}}x\le\frac{1}{7^7}$, 823543

$2\log_{\frac{1}{2}}x\le\frac{1}{7^7}-\frac{1}{1}$

$\log_{\frac{1}{2}}x\le\frac{1}{7^7\cdot 2}-\frac{1}{2}$

$x\ge(\frac{1}{2})^{\frac{1}{7^7\cdot 2}-\frac{1}{2}}=$



$x\in(-\infty,0)\cup\langle(\frac{1}{2})^{\frac{1}{7^7\cdot 2}-\frac{1}{2}},\infty)$

e) $\log_9\{3\log_2[1+\log_3(1-2\log_3x)]\}=\frac{1}{2}$

$3\log_2[1+\log_3(1-2\log_3x)]=3$

$1+\log_3(1-2\log_3x)=2$

$1-2\log_3x=3$

$\log_3x=-1$

$x=\frac{1}{3}$

$K=\{\frac{1}{3}\}$

OR: 1) $x\le 0$

2) $1-2\log_3x\le 0$

$-2\log_3x\le -1$ $x>0$

$\log_3x\ge\frac{1}{2}$

$x\ge\sqrt{3}$

4) $3\log_2[1+\log_3(1-2\log_3x)]\le 0$

$1+\log_3(1-2\log_3x)\le 1$

$1-2\log_3x\le 1$

$x\ge 1$

3) $1+\log_3(1-2\log_3x)\le 0$

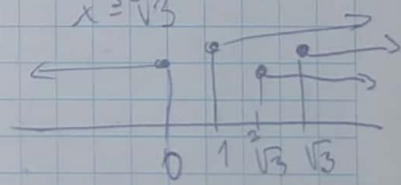
$\log_3(1+2\log_3x)\le -1$

$1-2\log_3x\le\frac{1}{3}$

$-2\log_3x\le -\frac{2}{3}$

$\log_3x\ge\frac{1}{3}$, 1,44

$x\ge\sqrt[3]{3}$



$x\in(-\infty,0\rangle\cup\langle 1,\infty)$

$x\in(0,1)$

3)

a) $\log_2\frac{1}{8}-3\log_5 0{,}2+\log_3 27+\log_4 1=\log_3 x$

$\log_a a^x=x$

$\frac{2}{10}=\frac{1}{5}=5^{-1}$

$\log_2(2^{-3})-3\log_5(0{,}2)+\log_3 27+\log_4 1=\log_3 x$

OF: $x>0$

$(5^{-3})^3$

$\log_2(2^{-3})-3\log_5 5^{-1}+\log_3 3^3+0=\log_3 x$

$-3+3+3$

$-3-3\cdot(-1)+3=\log_3 x$

$3=\log_3 x$

$3^3=x$

$x=27$

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dopočítať: (f)-(j)

b) $-\log_4 a + \frac{1}{2}\log_4 b^3 - 3\log_4 2 = \log_4 x$ OR: $a>0$; $b>0$; $x>0$

~~$\log_4 a^{-1} + \log_4 b^{\frac{3}{2}} - \log_4 2^3 = \log_4 x$~~

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

~~$\frac{1}{a} + \sqrt{b^3} - 8 = x$~~

~~$\frac{1}{a} + b\sqrt{b} - 8 = x$~~

~~$\frac{1 + ab\sqrt{b} - 8a}{a} = x$~~

~~$\frac{a(b\sqrt{b}-8)+1}{a}$~~

~~$\frac{\log_4 b^{\frac{3}{2}}}{\log_4 a^{-1}} - \log_4 2^3 = \log_4 x$~~

~~$\frac{\log_4 b^{\frac{3}{2}}}{\log_4 a^{-1}} = \log_4 x \cdot \log_4 2^3$~~

$\frac{1}{2}\log_4 b^3 - \log_4 a = \log_4 x + 3\log_4 2$

$\log_4 \frac{b\sqrt{b}}{a} = \log_4 (8x)$

$\frac{b\sqrt{b}}{a} = 8x$

$x = \frac{b\sqrt{b}}{8a}$

$K = \left\{\frac{b\sqrt{b}}{8a}\right\}$

---

c)

~~$-\log_4 a + \frac{1}{2}\log_4 b^3 - 3\log_4 2 = \log_4 x$~~

$10\log x^2 + 4\log x^5 + 3\log x^3 + 2\log\sqrt{x} = 100$

$10 \cdot 2\log x + 4 \cdot 5\log x + 3 \cdot 3\log x + 2 \cdot \frac{1}{2}\log x = 100$ OR: $x>0$

$20\log x + 20\log x + 9\log x + \log x = 100$

$50\log x = 100$

$\log x = 2$

$x = 10^2 = 100$

$K = \{100\}$

---

d) $\log x^2 + \log\sqrt{x} - \log\frac{1}{x} = \frac{35}{2}$ (OR: $x>0$)

$2\log x + \frac{1}{2}\log x - (\log 1 - \log x) = \frac{35}{2}$

$2\log x + \frac{1}{2}\log x + \log x = \frac{35}{2}$

~~$2\log x + \frac{\log x}{2} + \frac{2\log x}{1} = \frac{35}{2}$~~

~~$2\log x + \frac{3\log x}{2}$~~

$2\log x + \log(x^{\frac{1}{2}} \cdot x) = \frac{35}{2}$

$2\log x + \log x^{\frac{3}{2}} = \frac{35}{2}$

$\log(x^2 \cdot x^{\frac{3}{2}}) = \frac{35}{2}$

$\frac{7}{2}\log x = \frac{35}{2}$

$\log x = 5$

$x = 10^5 = 100000$

$K = \{100000\}$

e) $\ln 2x + \ln x^2 - \ln\sqrt[3]{x} = 1 + \ln 2 - \ln x^{-3}$

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

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

$3\ln x - \cancel{\frac{1}{3}\ln x} = 1 - \cancel{\frac{1}{3}\ln x}$

$3\ln x = 1$

$\ln x = \frac{1}{3}$

$x = e^{\frac{1}{3}}$

$x = \sqrt[3]{e}$

$x \doteq 1{,}396$

OR: $x>0$

$K = \{\sqrt[3]{e}\}$

Naskenované pomocou CamScanner

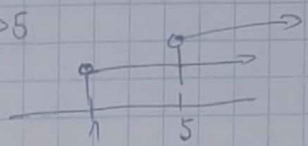
MÁRIA MATUŠISKOVÁ

4) $x \in R$

a) $\log\sqrt{2x-2} = \log(x-5)$ OR: $2x-2 \geq 0$ $\quad x-5>0$

$\sqrt{2x-2} = x-5 \,|^2$ $\quad 2x \geq 2$ $\quad x>5$

$2x-2 = x^2-10x+25$ $\quad x \geq 1$



$x \in (5,\infty)$

$-x^2+12x-27=0$

$x^2-12x+27=0$ $\quad K=\{9\}$

$x_1=3$

$x_2=9$

Sk: $\log\sqrt{2\cdot 3-2} = \log(3-5)$

$\log 2 = \log -2$

$\emptyset$

$\log\sqrt{2\cdot 9-2} = \log(9-5)$

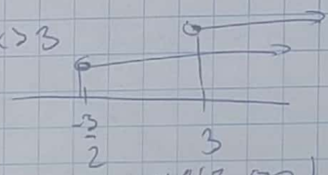
$\log 4 = \log 4$ ✓

---

b) $\log\sqrt{2x+3} = \log(x-3)$ OR: $2x+3 \geq 0$ $\quad x-3>0$

$\sqrt{2x+3} = (x-3)\,|^2$ $\quad 2x \geq -3$ $\quad x>3$

$2x+3 = x^2-6x+9$ $\quad K=\{4+\sqrt{10}\}$ $\quad x \geq -\frac{3}{2}$



$x \in (3,\infty)$

$-x^2+8x-6=0$

$x^2-8x+6=0$

$x_{1,2} = \frac{8 \pm \sqrt{64-24}}{2} = \frac{8 \pm \sqrt{40}}{2} = \frac{8 \pm 2\sqrt{10}}{2} = \frac{2(4 \pm \sqrt{10})}{2} = \begin{cases} 4+\sqrt{10} \\ 4-\sqrt{10} \end{cases}$

Sk: $\log\sqrt{2(4+\sqrt{10})+3} = \log((4+\sqrt{10})-3)$

$\log\sqrt{11+2\sqrt{10}} = \log 1+\sqrt{10}$

---

c) $\log_2\sqrt{x+1} = 3-\log_2 4$ OR: $x+1 \geq 0$ Sk: $\log_2\sqrt{3+1} = 3-\log_2 4$

$\log_2\sqrt{x+1} = 3-2$ $\quad x \geq -1$ $\quad \log_2 2 = 3$

$\log_2\sqrt{x+1} = 1$ $[\log_2 2 = 1]$ $\quad x \in \langle -1,\infty)$ $\quad 1 = 3-2$

$\sqrt{x+1} = 2\,|^2$ $\quad K=\{3\}$ $\quad 1=1$ ✓

$x+1=4$

$x=3$

---

d) $\log_8\sqrt{x+30} + \log_8\sqrt{x} = 1$ $\quad \frac{1}{2}\log_8(x+30) + \frac{1}{2}\log_8 x = 1$ $\quad x=-32$ $\quad$ OR: $x+30 \geq 0$

$\log_8(\sqrt{x+30}\cdot\sqrt{x}) = \log_8 8$ $\quad \log_8(x+30)+\log_8 x = 2$ $\quad x=2$ $\quad x \geq -30$

$\sqrt{x+30}\cdot\sqrt{x} = 8\,|^2$ $\quad \log_8((x+30)\cdot x) = 2$ $\quad x \geq 0$

$K=\{2\}$ $\quad x \in \langle 0,\infty)$

$(x+30)x = 64$ $\quad x^2+30x-64=0$ $\quad x^2+32x-2x-64=0$

$x^2+30x-64=0$ $\quad x(x+32)-2(x+32)=0$

$x_{1,2} = \frac{-30 \pm \sqrt{900-4\cdot 2}}{2}$ $\quad (x+32)(x-2)=0$

dopočítať: (e)-(g)

MÁRIA MATUŠISKOVÁ

5) $x \in R$

a) $\frac{\log(x^2+13)}{2\log(x+5)}=1$

OR: $x^2+13>0$ $\quad x+5\neq 0$ $\quad x+5>0$

$x^2>-13$ $\quad x\neq -5$ $\quad x>-5$

R

$\cancel{\forall}\in$

$x\in(-5,\infty)$

~~$\log(x^2+13)=2\log(x+5)=1$~~

$\log(x^2+13)=2\log(x+5)$

$\log(x^2+13)=\log(x+5)^2$

$\cancel{x^2}+13=\cancel{x^2}+10x+25$

$-10x=12$

$x=-\frac{6}{5}=-1\frac{1}{5}$

$K=\left\{-\frac{6}{5}\right\}$

---

b) $\frac{\log(2x+13)}{\log(x+5)}=2$

OR: $2x+13>0$ $\quad x+5>0$ $\quad x\neq -5$

$2x>-13$ $\quad x>-5$

$x>-\frac{13}{2}$ $-6{,}5$

$-6{,}5$ -5

$x\in(-5,\infty)$

$\log(2x+13)=2\log(x+5)$

$\log(2x+13)=\log(x+5)^2$

$2x+13=x^2+10x+25$

$-x^2-8x-12=0$

$x^2+8x+12=0$

$x^2+6x+2x+12=0$

$x(x+6)+2(x+6)=0$

$(x+2)(x+6)=0$

$x_1=-2;\ x_2=-6$

$K=\{-2\}$

---

c) $\frac{\log(x^2+3)}{\log(x+3)}=2$

OR: $x^2+3\geq 0$ $\quad x+3\neq 0$ $\quad x+3>0$

$x^2\geq -3$ $\quad x\neq -3$ $\quad x>-3$

0

$x\in(-3,\infty)$

$\log(x^2+3)=2\log(x+3)$

$\log(x^2+3)=\log(x+3)^2$

$\cancel{x^2}+3=\cancel{x^2}+6x+9$

$-6x=6$

$x=-1$

$K=\{-1\}$

dopočítaj (d)-(e)

MÁRIA MATÚŠEKOVÁ

6) $x \in R$

$\log_{a^y}(b) = \frac{1}{y} \cdot \log_a b$

a) $\log_2 x + \log_8 x = 8$

$\log_2 3 = 8$

$\log_2 x + \log_{2^3} x = 8$

OR: $x > 0$

Sk: $\log_2 64 + \log_8 64 = 8$

$\log_2 x + \frac{1}{3}\log_2 x = 8$

$6\log_2 2 + 2\log_8 8 = 8$

$\cancel{\log_2 (x \cdot \sqrt[3]{x}) = 8 \log_2 3}$

$8 = 8$ ✓

$\cancel{x\sqrt[3]{x} = 3}$ $\frac{4}{3}\log_2 x = 8$

$K = \{64\}$

$\cancel{\sqrt[3]{x^4} = 3 \,|^3}$ $\log_2 x = 6$

$\cancel{x^4 = 27}$ $x = 2^6 = 64$

b) $\log_9 x + \log_3 x = 6$ OR: $x > 0$

$\log_{3^2} x + \log_3 x = 6$ Sk: $\log_9 81 + \log_3 81 = 6$

$\frac{1}{2}\log_3 x + \log_3 x = 6$ $2\log_9 9 + \log_3 3 = 6$

$\log_3(x^{\frac{1}{2}} \cdot x) = 6$ $6 = 6$ ✓

$\frac{3}{2}\log_3 x = 6$

$K = \{81\}$

$\log_3 x = 4$

$x = 81$

c) $\log_7 2 + \log_{49} x = \log_{\frac{1}{7}} \sqrt{3}$ OR: $x > 0$

$\log_7 2 + \frac{1}{2}\log_7 x = -\frac{1}{2}\log_7 3$

$\cancel{\log_7 (2 \cdot \sqrt{x}) = \log_7 \frac{1}{\sqrt{3}}} \,|^2$

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

$K = \{\frac{1}{12}\}$

$4x = \frac{1}{3}$

$x = \frac{1}{12}$

$\frac{1}{\sqrt{3}} = \frac{1}{\sqrt{3}}$

Sk: $\cancel{\log_7 2 + 2\log_{49} \frac{1}{12} = \log_{\frac{1}{7}} \sqrt{3}}$

$\cancel{\log_7 \frac{2}{144} = \log_7 \frac{1}{\sqrt{3}}}$

$\cancel{\log_7 \frac{1}{72} = \log_7 \frac{1}{\sqrt{3}}}$

Sk: $\log_7 2 + \frac{1}{2}\log_7 x = \frac{1}{2}\log_7 \frac{1}{3}$

$\log_7 2\sqrt{\frac{1}{12}} = \log_7 \frac{1}{\sqrt{3}}$

$\frac{2}{2\sqrt{3}} = \frac{1}{\sqrt{3}}$

d) $\log_{16} x + \log_4 x + \log_2 x = 7$ OR: $x > 0$

$4\log_2 x + 2\log_2 x + \log_2 x = 7$ Sk: $\log_{16} 2 + \log_4 2 + \log_2 2 = 7$

$\log_2(x^4 \cdot x^2 \cdot x) = 7$ $\log_2 16 + 2\log_2 4 + \log_2 2 = 7$

$K = \{2\}$

$7\log_2 x = 7$ $4 \cdot 2 + 2 \cdot 1 + 1 = 7$

$\log_2 x = 1$ $7 = 7$ ✓

$x = 2$

7) a) $\log_2(4 \cdot 3^x - 6) - \log_2(9^x - 6) = 1$ $x \in R$

$t = 3$ $3^x = 3$ $x = 1$ $9^x - 6 > 0$

$9^x > 6$

$\log_2\left(\frac{4 \cdot 3^x - 6}{9^x - 6}\right) = 1$ $\frac{4t - 6}{t^2 - 6} = 2$ $t = 1$ $3^x = 1 \; 3^0$

$3^{2x} > 3 \cdot 2$

$x = 0$

$4t - 6 = 2(t^2 - 6)$

$K = \{1\}$

$\frac{4 \cdot 3^x - 6}{9^x - 6} = 2$

$2(2t - 3) = 2(t^2 - 6)$ $t^2 - 2t - 3 = 0$

OR: $4 \cdot 3^x - 6 > 0$

$\frac{4 \cdot 3^x - 6}{3^{2x} - 6} = 2$ $-t^2 + 2t + 3 = 0$ $t = 3$ $4 \cdot 3^x > 6$

3^x SUB. $t = -1$ $3^x > \frac{6}{4}$

$3^x > \frac{3}{2}$

MÁRIA MATUŠISKOVÁ

b) $\log_7(2^x-1)+\log_7(2^x-7)=1$

$\log_7\left((2^x-1)\cdot(2^x-7)\right)=1$

$\log_7\left((2^x-1)(2^x-7)\right)=\log_7 7$

$(2^x-1)(2^x-7)=7$

SUB: $t=2^x$

$(t-1)(t-7)=7$

$t^2-7t-t+7=7$

$t^2-8t=0$

$t(t-8)=0$

$t=0 \wedge t=8$

$t=0 \quad 2^x=0 \quad \emptyset$

$t=8 \quad 2^x=8$

$2^x=2^3$

$x=3$

OR: $2^x-1>0 \quad 2^x>7$

$2^x>1 \quad \emptyset$

$x>0$

$x\in(0,\infty)$

SK: $\log_7(2^3-1)+\log_7(2^3-7)=1$

$1+0=1$

$1=1$ ✓

$K=\{3\}$

---

e) $\log 10+\frac{1}{3}\log(3^{2\sqrt{x}}+271)=2$

$\cancel{\log 10}=1+\frac{1}{3}\log(9^{\sqrt{x}}+271)=2$

$\frac{1}{3}\log(9^{\sqrt{x}}+271)=1$

$\log(9^{\sqrt{x}}+271)=3$

$9^{\sqrt{x}}+271=10^3$

$9^{\sqrt{x}}=729$

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

$\sqrt{x}=3$

$x=9$

OR: $3^{2\sqrt{x}}+271>0$

$3^{2\sqrt{x}}>-271$

$9^{\sqrt{x}}>-271$

$\mathbb{R}$

$K=\{9\}$

---

d) $2+\log_2(3^{x-2}+1)=\log_2(9^{x-2}+7)$

$2+\log_2(3^x\cdot\frac{1}{3^2}+1)=\log_2(3^{2x}\frac{1}{3^2}+7)$

$2\to\log_2 4+\log_2(3^{2x}\frac{1}{3^2}+1)=\log_2(3^x\frac{1}{3^2}+7)$

$\cancel{\log_2}(4\cdot(3^x\frac{1}{3^2}+1))=\cancel{\log_2}(3^x\frac{1}{3^2}+7)$

$2^2 3^x\frac{1}{3^2}+4=3^x\frac{1}{3^2}+7$

$2^2 3^x 3^{-2}-3^x 3^{-2}=3$

SUB: $t=3^{x-2}$

$4t-t^2=3$

$-t^2+4t-3=0$

$t^2-4t+3=0$

$t_1=3 \quad 3^{x-2}=3 \quad x-2=1 \quad x=3$

$t_2=1 \quad 3^{x-2}=1 \quad x-2=0 \quad x=2$

OR: $3^{x-2}+1>0 \quad 9^{x-2}>-7$

$3^{x-2}>-1 \quad \emptyset$

$\emptyset$

$K=\{2,3\}$

* dopočítaj i(e)–(c)

MÁRIA MATÚŠISKOVÁ

8. $x \in R$

a) $\log x - \dfrac{1}{\log x} = 0$

$\cancel{\log x - X}$ SUB.: $\log x = t$

$t - \dfrac{1}{t} = 0 \quad t \neq 0$

$\dfrac{t^2 - 1}{t} = 0$

$t^2 = 1$

$t = \pm 1$

$t = 1 \quad \log x = 1 \quad x = 10$

$t = -1 \quad \log x = -1 \quad x = 10^{-1} = \frac{1}{10}$

OR: $x > 0 \quad x \neq 0 \quad x \in (0, \infty)$

$K = \{\frac{1}{10}; 10\}$

---

b) $\log x + \dfrac{3}{\log x} = 4$

SUB.: $t = \log x$

$t + \dfrac{3}{t} = 4 \quad t \neq 0$

$\dfrac{t^2 + 3}{t} = 4$

$t^2 - 4t + 3 = 0$

$t_1 = 1 \quad \log x = 1 \quad x = 10$

$t_2 = 3 \quad \log x = 3 \quad x = 10^3$

OR: $x > 0 \quad x \neq 0 \quad x \in (0, \infty)$

$K = \{10, 1000\}$

Sk: $\log^1 10 + \dfrac{3}{\log 10} = 4$

$4 = 4$ ✓

$\log 1000 + \dfrac{3}{\log 1000} = 4$

$3 \cdot 1 + \dfrac{3}{3} = 4$

$4 = 4$ ✓

---

c) $\log x + \dfrac{4}{\log x} = 4$

SUB.: $t = \log x \quad t \neq 0$

$t^2 - 4t + 4 = 0$

$t = 2 \quad \log x = 2 \quad x = 10^2$

$K = \{2\}$

OR: $x > 0, \ x \neq 0$

Sk: $\log 100 + \dfrac{4}{\log 100} = 4$

$2 + \dfrac{4}{2} = 4$ ✓

---

d) $\log x - \dfrac{20}{\log x} = 1$

SUB.: $\log x = t \quad t \neq 0$

$t^2 - t - 20 = 0 \quad t \neq 0$

$t_1 = -4 \quad \log x = -4 \quad x = 10^{-4} \ \frac{1}{10^4}$

$t_2 = 5 \quad \log x = 5 \quad x = 10^5$

$K = \{\frac{1}{10^4}; 10^5\}$

OR: $x > 0 \cdot x \neq 0$

Sk: $-4 \log 10 - \dfrac{20}{-4 \log 10} = 1$

$-4 + \dfrac{20}{+4} = 1$

$-4 + 5 = 1$

$1 = 1$ ✓

$5 \log 10 - \dfrac{20}{5 \log 10} = 1$

$5 - 4 = 1$

$1 = 1$ ✓

---

e) $\dfrac{1}{1 + \log x} + \dfrac{5}{3 - \log x} = 3$

SUB.: $\log x = t \quad t \neq -1 \quad t \neq 3$

$\dfrac{1}{1+t} + \dfrac{5}{3-t} = 3$

$\dfrac{3 - t + 5(1+t)}{(1+t)(3-t)} = 3$

$\dfrac{8 + 4t}{(1+t)(3-t)} = 3$

$\dfrac{4(2+t)}{(1+t)(3-t)} = 3$

$4(2+t) = 3(1+t)(3-t)$

$8 + 4t = \cancel{3(3+2t-t^2)}$

$\cancel{t^2 + 2t + 5 = 0}$

$8 + 4t = 9 + 6t - 3t^2$

$3t^2 - 2t - 1 = 0$

$t_{1,2} = \dfrac{2 \pm \sqrt{4 + 12}}{6} = \begin{cases} 1 \\ -\frac{1}{3} \end{cases}$

$t_1 = 1 \quad \log x = 1 \quad x = 10$

$t = -\frac{1}{3} \quad \log x = -\frac{1}{3}$

$x = 10^{-\frac{1}{3}} \quad \dfrac{1}{10^{\frac{1}{3}}} \quad \dfrac{1}{\sqrt[3]{10}} = \dfrac{\sqrt[3]{10}}{10}$

$K = \{\frac{\sqrt[3]{10}}{10}; 10\}$

OR: $x > 0 \quad x \neq 0 \quad x \in (0, \infty)$

MÁRIA MATUŠISKOVÁ

f) $\cancel{\log x^3 - \frac{6}{\log x} = 7}$

$\cancel{SUB.: \log x = t}$

$\cancel{t^3 - \frac{6}{t} = 7}$

$\cancel{\frac{t^4 - 6}{t} = 7}$

$\log x^3 - \frac{6}{\log x} = 7$

$3\log x - \frac{6}{\log x} = 7$

SUB.: $\log x = t$

$3t - \frac{6}{t} = 7$

$\frac{3t^2 - 6}{t} = 7$ $\quad t \neq 0$

$3t^2 - 6 = 7t$

$3t^2 - 7t - 6 = 0$ (11)

$t_{1,2} = \frac{7 \pm \sqrt{49 + 72}}{6} = \begin{cases} \frac{19}{6} = 2 \\ -\frac{4}{6} = -\frac{2}{3} \end{cases}$

$t = 2 \quad \log x = 2$

$x = 10^2$

$t = -\frac{2}{3} \quad \log x = -\frac{2}{3}$

$x = 10^{-\frac{2}{3}} = \frac{1}{10^{\frac{2}{3}}} = \frac{1}{\sqrt[3]{10^2}}$

OR: $x > 0 \quad x \neq 0$

$\log_{10} x = 0$

$x = 1$

$K = \left\{ 10^2 ; \frac{1}{\sqrt[3]{10^2}} \right\}$

---

g) $\frac{20}{\log x^2} - \log x^3 = 1$

$\frac{20}{2\log x} - 3\log x = 1$

SUB.: $t = \log x$

$\frac{20}{2t} - 3t = 1$ $\quad t \neq 0$

$\frac{20 - 6t^2}{2t} = 1$

$20 - 6t^2 = 2t$

$-6t^2 - 2t + 20 = 0$

$6t^2 + 2t - 20 = 0$

$3t^2 + t - 10 = 0$

$t_{1,2} = \frac{-1 \pm \sqrt{1 + 120}}{6} = \frac{-1 \pm 11}{6} = \begin{cases} \frac{10}{6} = \frac{5}{3} \\ -\frac{12}{6} = -2 \end{cases}$

$t = -2 \quad \log x = -2$

$x = 10^{-2} = \frac{1}{10^2}$

$t = \frac{5}{3} \quad \log x = \frac{5}{3}$

$x = 10^{\frac{5}{3}} = \sqrt[3]{10^5} = 10\sqrt[3]{10^2}$

OR: $x > 0$

$x \neq 0$

$K = \left\{ \frac{1}{10^2} ; 10\sqrt[3]{10^2} \right\}$

---

9) a) $\log_2^2 x + 2\log_2 x - 3 = 0$ $\quad x \in \mathbb{R}$

$\log_2 x^2 + 2\log_2 x - 3 = 0$

SUB.: $\log_2 x = t$

$t^2 + 2t - 3 = 0$

$t = -3 \quad \log_2 x = -3 \quad x = 2^{-3} = \frac{1}{8}$

$\cancel{x = 10^{-3} = \frac{1}{10^3}}$

$t = 1 \quad \log_2 x = 1 \quad \cancel{x = 10} \quad x = 2$

OR: $x > 0$

$\cancel{SK: \log_2^2}$

$\cancel{K = \left\{ \frac{1}{10^3}, 10 \right\}}$

$K = \left\{ 2, \frac{1}{8} \right\}$

---

b) $\log^2 x - 3\log x = \log x^2 - 4$

$\cancel{\log x^2 - 3\log x - \log x^2 = -4}$

$\cancel{\log x = \frac{4}{3}}$

$\cancel{x = 10^{\frac{4}{3}}}$

$\log x^2 - 3\log x = 2\log x - 4$

SUB.: $t = \log x$

$t^2 - 3t = 2t - 4$

$t^2 - 5t + 4 = 0$

$t = 4 \quad \log x = 4$

$x = 10^4$

$t = 1 \quad \log x = 1$

$x = 10$

OR: $x > 0$

$x \in (0, \infty)$

$K = \left\{ 10, 10^4 \right\}$

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dopočítaj (d)-(f)

c) $4\log_9 x(\log_9 x-1)=2+\log_9 x$ OR: $x>0$ $x\in(0,\infty)$

SUB: $\log_9 x=t$ $4\log_9 x^2-4\log_9 x=2+\log_9 x$

$\cancel{4t(t-1)=2+t}$ $4\log_9 x^2-5\log_9 x-2=0$

$\cancel{4t^2-4t=2+t}$ SUB.: $\log_9 x=t$

$\cancel{4t^2-5t-2=0}$ $4t^2-5t-2=0$

$\cancel{t_{1,2}=\frac{5\pm\sqrt{25+32}}{8}}$ $t_{1,2}=\frac{5\pm\sqrt{25+32}}{8}=\frac{5\pm\sqrt{57}}{8}$

$t=\frac{5+\sqrt{57}}{8}$ $\log_9 x=\frac{5+\sqrt{57}}{8}$

$x=9^{\frac{5+\sqrt{57}}{8}}$

$t=\frac{5-\sqrt{57}}{8}$ $\log_9 x=\frac{5-\sqrt{57}}{8}$

$x=9^{\frac{5-\sqrt{57}}{8}}$

$K=\left\{9^{\frac{5-\sqrt{57}}{8}};\ 9^{\frac{5+\sqrt{57}}{8}}\right\}$

10.) $x\in R$ OR: $x>0$ $\log_a(b^c)=c\cdot\log_a(|b|)$

$a^{\log_a x}=x$

a) $x^{\log x}=10000$

$\log(x^{\log x})=\log 10000$

$\log(x^{\log x})=4\log 10$

$\log x(\log(|x|))=4\log 10$

$\log x\cdot\log x=4$

$\log x^2=4$

$\log x=\pm\sqrt{4}$

$\log x=\pm 2$

$\log x=2$

$x=10^2$

$\log x=-2$

$x=10^{-2}=\frac{1}{10^2}$

$K=\left\{10^2;\ \frac{1}{10^2}\right\}$

b) $x^{\log 3\sqrt{x}}=1000$

$\log 3\sqrt{x}=1000$

$\downarrow$

$\log(x^{\log 3\sqrt{x}})=\log 10^4$

$(\log 3\sqrt{x})\cdot\log(|x|)=4\log 10$

$\cancel{\log 3x+\log 3\sqrt{x}\cdot\log x=4}$

$\cancel{(\log 3+\log\sqrt{x})\log x=4}$

$(\log 3\sqrt{x})\cdot\log x=4$

c) $x^{1-\frac{1}{2}\log x}=10$ OR: $x>0$

$\log x(x^{1-\frac{1}{2}\log x})=\log_{10}10$

$\log(1-\frac{1}{2}\log x)(\log(|x|))=1$

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

SUB: $\log x=t$

$t-\frac{t^2}{2}=1$

$\frac{2t-t^2}{2}=1$

$2t-t^2=2$

$+t^2-2t-2=0$

$K=\emptyset$

dopočítaj (d)-(f)

Mária Hatašková

11) a) $x^{\log x} = 1000x^2$ $\quad x \in \mathbb{R}$

$\cancel{\log(x^{\log x}) = 2\log x}$

$\log x \log x = 2\log x + 3$

$\log x^2 = 2\log x + 3$

SUB: $t = \log x$

$t^2 - 2t - 3 = 0$

$t = -1 \quad \log x = -1 \quad x = \frac{1}{10}$

$t = 3 \quad \log x = 3 \quad x = 10^3$

$x > 0$

$x \in (0, \infty)$

$K = \{\frac{1}{10}, 10^3\}$

- nerovnice

1)

a) $\frac{\log x + 1}{\log x - 2} < 0$

OR: $x > -1$, $x \neq 2$ $\quad \log x - 2 \neq 0$

$x > 2$ $\quad \log x \neq 2$

$x \neq 100$

$(-\infty, -1)$ $(-1, 2)$ $(2, \infty)$ $\quad (-\infty, 0) \cup \{100\}$

$\cancel{\log(x+1)} - \log(x-2) < 0$

$\log(x+1) < \cancel{\log(x-2)}$

$\cancel{x+1 < x-2}$

$1 < -2$

x

$\log x + 1 < 0$	$\log x + 1 > 0$
$\log x - 2 > 0$	$\log x - 2 < 0$
$x < \frac{1}{10}$	$x > \frac{1}{10}$
$x > 100$	$x < 100$

$\frac{1}{10}$ $\quad \emptyset \quad 100$ $\qquad \frac{1}{10} \quad 100$

$x \in (\frac{1}{10}, 100)$

SUB: $\log x = t$

$\frac{t+1}{t-2} < 0$

idk

$x \in ($

2	$(-\infty, -1)$	$(-1, 2)$	$(2, \infty)$
$t+1$	$-$	$+$	$+$
$t-2$	$-$	$-$	$+$
	$+$	$-$	

---

b) $\frac{2 - \log x}{\log x} > 1$ $\quad$ SUB: $t = \log x$

$2 - \log x - \log x > 1$

OR: $\cancel{x > 0}$ $\quad x > 0$

$\log x \in (0, 1)$ $\quad -2\log x > -1$

$\log x < \frac{1}{2}$

$\log x > 0$

$x > 1$

$\log x < 1$

$x < 10$

$x \in (1, 10)$

$x < \sqrt{10}$

$x \in (-\infty, \sqrt{10})$ $\quad x \in (0, 1)$

$K = (0, \sqrt{10})$

$\frac{2-t}{t} > 1$

$\frac{2-t}{t} - 1 > 0$

$\frac{2-t-t}{t} > 0$

$\frac{2-2t}{2} > 0$

$\frac{2(1-t)}{2} > 0$

$1 - t > 0$

$t < 1$

c) $\frac{1}{\log x} + \frac{1}{3} \geq 0$ $\quad$ OR: $x > 0$

$\cancel{\frac{1}{\log x} \geq -\frac{1}{3}}$

$\frac{3 + \log x}{3\log x} \geq 0$

SUB: $t = \log x$

$\frac{3+t}{3t} > 0$

	$(-\infty, 0)$	$(0, 3)$	$(3, \infty)$
$3+t$	$-$	$+$	$+$
$3t$	$-$	$+$	$+$
			$+$

?