

KVADRATNA JEDNAČINA, NEJEDNAČINA I FUNKCIJA

$$ax^2 + bx + c = 0, \quad a \neq 0$$

1, $b = c = 0 \Rightarrow ax^2 = 0 \Rightarrow x = 0$

2, $b = 0, c \neq 0 \Rightarrow ax^2 + c = 0 \Rightarrow x^2 = -\frac{c}{a}$

3, $b \neq 0, a = 0 \Rightarrow ax^2 + bx = 0 \Rightarrow x(ax + b) = 0$

$$\Rightarrow x = 0 \quad \vee \quad x = -\frac{b}{a}$$

4, $b \neq 0, c \neq 0 \Rightarrow ax^2 + bx + c = 0$

$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

(P1)

$$1, \quad 3x^2 - 2x = 0$$

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

$$x = 0 \quad \vee \quad 3x - 2 = 0$$

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

$$2, \quad 6x^2 - x - 2 = 0$$

$$x_{1/2} = \frac{1 \pm \sqrt{1 + 48}}{12} = \frac{1 \pm 7}{12} = \left\{ \begin{array}{l} \frac{8}{12} = \frac{2}{3} \\ -\frac{6}{12} = -\frac{1}{2} \end{array} \right.$$

x_1, x_2 - raíces cu. de $ax^2 + bx + c = 0$

$$ax^2 + bx + c = a(x - x_1)(x - x_2)$$

(P2)

$$3x^2 - 7x + 1 = 0$$

$$x_{1,2} = \frac{7 \pm \sqrt{49 - 12}}{6} = \frac{7 \pm \sqrt{37}}{6}$$

$$x_1 = \frac{7 + \sqrt{37}}{6}, \quad x_2 = \frac{7 - \sqrt{37}}{6}$$

$$3x^2 - 7x + 1 = 3 \cdot \left(x - \frac{7 + \sqrt{37}}{6} \right) \left(x - \frac{7 - \sqrt{37}}{6} \right)$$

$$D = b^2 - 4ac \quad - \text{DISKRIMINANTA}$$

$$D > 0 \Rightarrow x_1, x_2 \in \mathbb{R}, x_1 \neq x_2$$

$$D = 0 \Rightarrow x_1, x_2 \in \mathbb{R}, x_1 = x_2$$

$$D < 0 \Rightarrow \text{PAR KONJUGOVANO KOMPLIČESNIT BROJEVA} = (x-1)^2$$

$$x^2 - 2x + 1 = 0$$

$$x_{1,2} = \frac{2 \pm \sqrt{4-4}}{2} = \frac{2}{2} = 1$$

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

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

$$f(x) = \boxed{y = ax^2 + bx + c, a \neq 0}$$

KVADRATNA
FUNKCIJA

$$D = \mathbb{R}$$

NIKE $T_1(x_1, 0)$

$T_2(x_2, 0)$

PRESEK SA y-OSOM $(0, c)$

$$D = 0$$

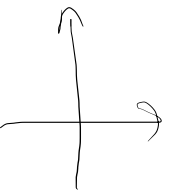
DODIRUJE x-OSU

$$D > 0$$


SEČE x-OSU U DVE TAČKE

$$D < 0$$

NE SEČE, NE DODIRUJE
x-OSU



$a > 0$ PARABOLA SA OTVOROM NA GORE 

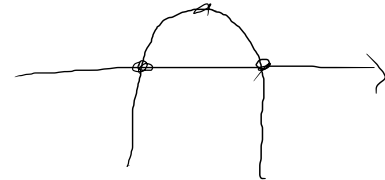
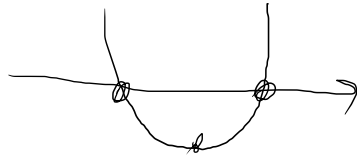
$a < 0$ PARABOLA SA OTVOROM NA DOLE 

TEME PARABOLE $T \left(-\frac{b}{2a}, \frac{4ac - b^2}{4a} \right)$

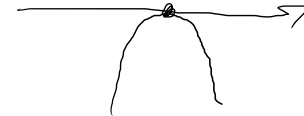
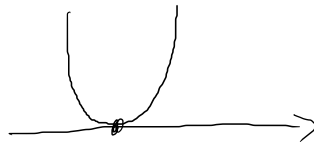
$a > 0$

$a < 0$

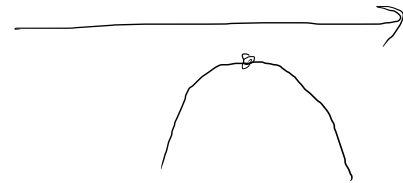
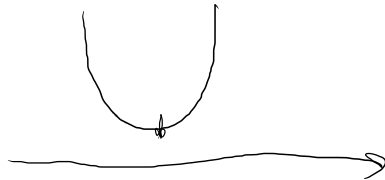
$D > 0$



$D = 0$



$D < 0$



(P23)

$$y = -x^2 - 3x - 4$$

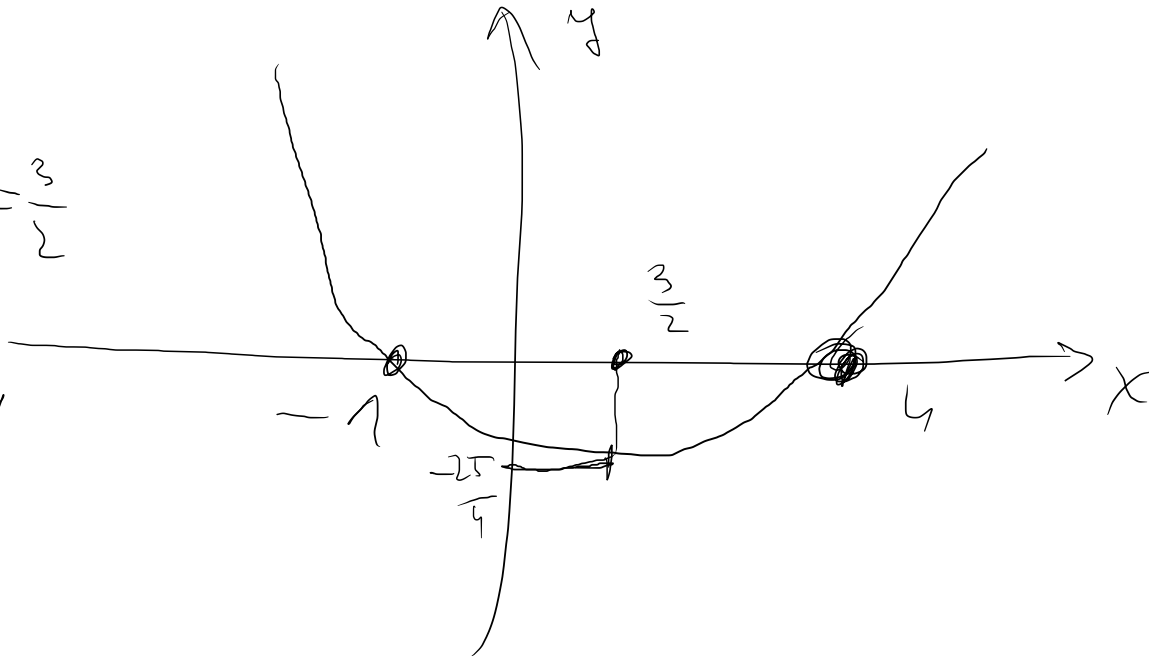
$$y = 0$$

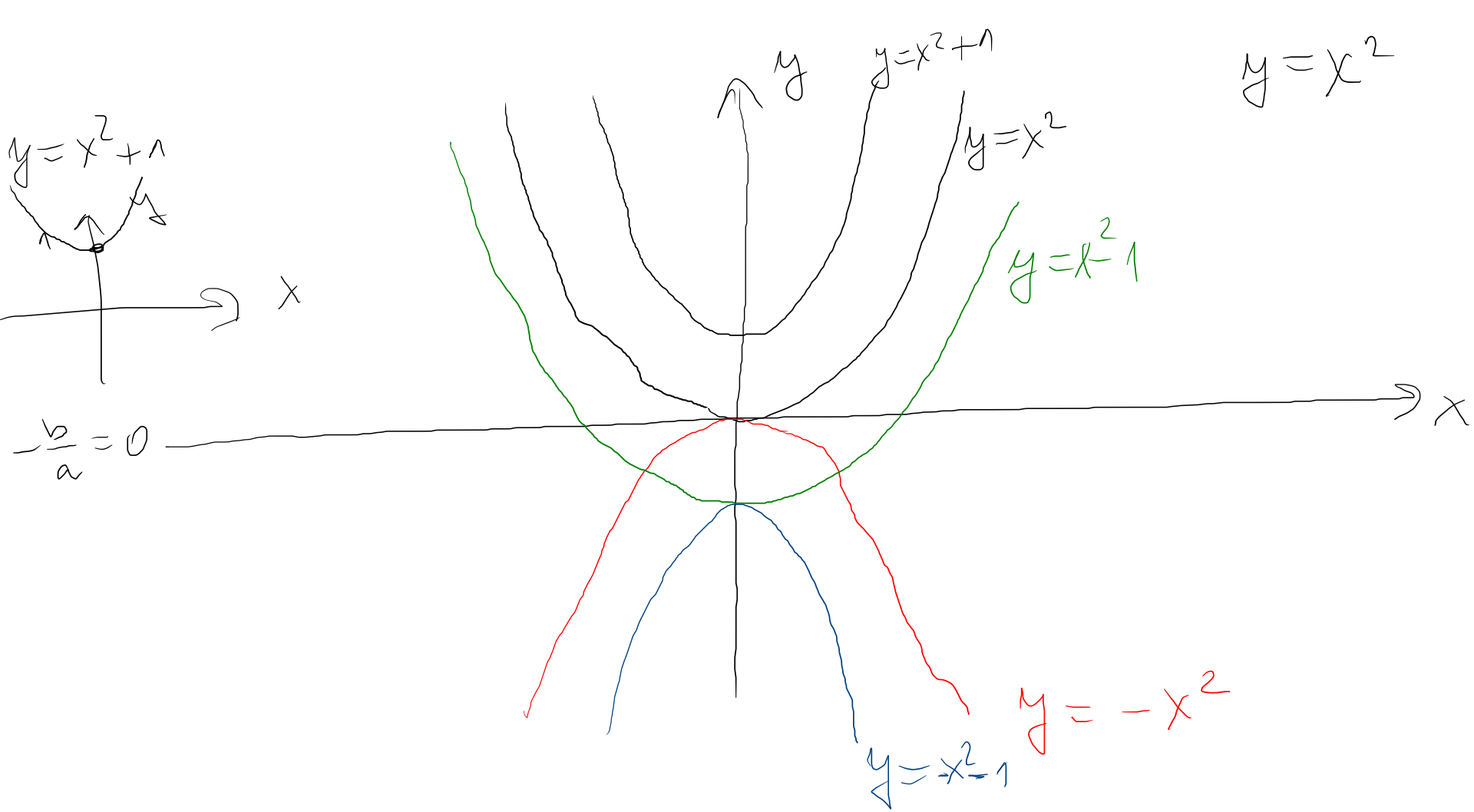
$$x_{1,2} = \frac{3 \pm \sqrt{9 + 16}}{2} = \frac{3 \pm 5}{2} \left(\begin{array}{l} 4 \\ -1 \end{array} \right)$$

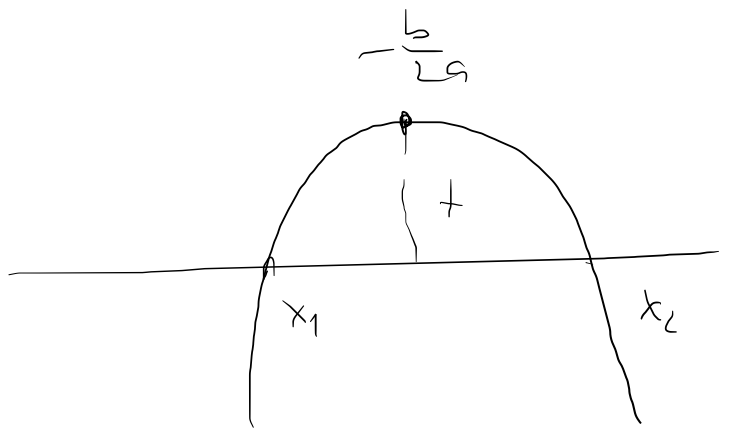
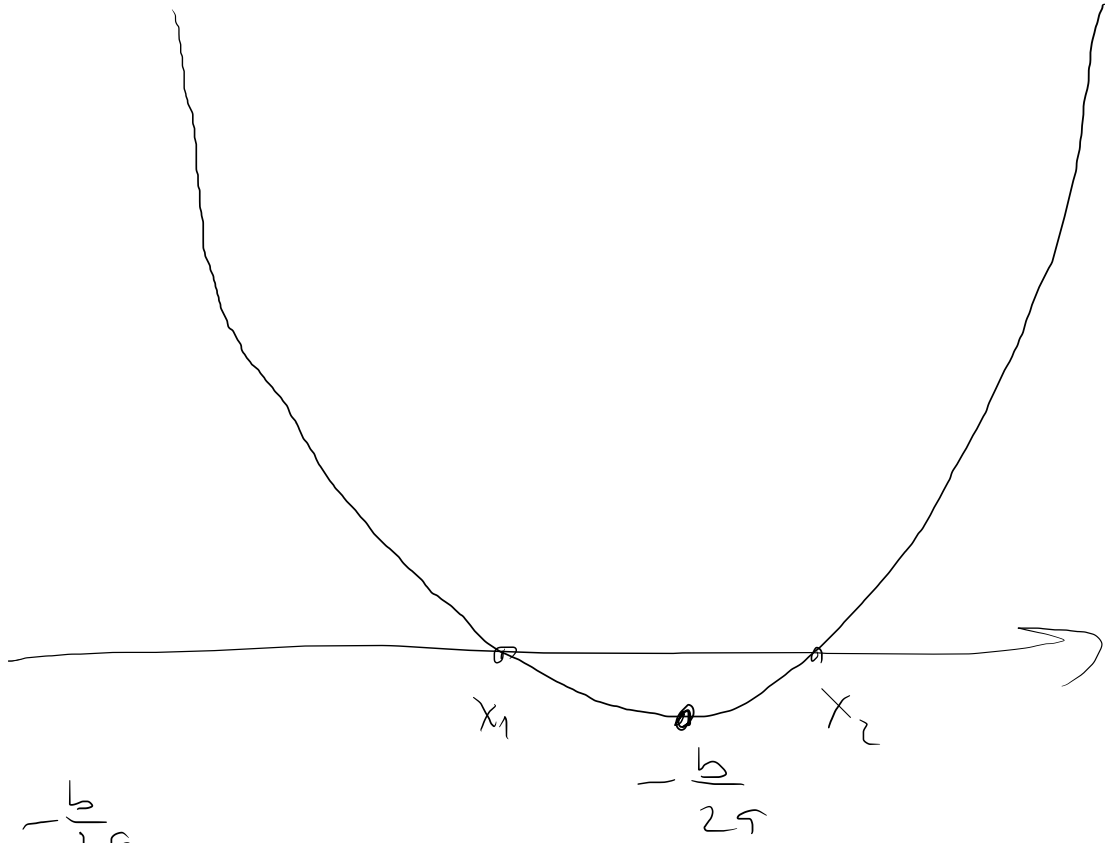
$$T\left(\frac{3}{2}, 1\right)$$

$$-\frac{b}{2a} = -\frac{-3}{2} = \frac{3}{2}$$

$$\begin{aligned} y\left(\frac{3}{2}\right) &= \frac{9}{4} - \frac{9}{2} - 4 \\ &= \frac{9 - 18 - 16}{4} \\ &= \frac{-25}{4} \end{aligned}$$






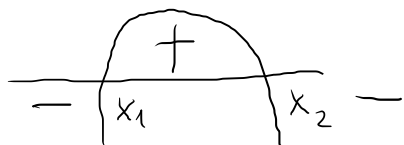
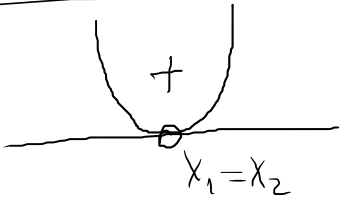

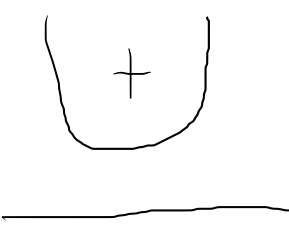



$$ax^2 + bx + c > 0$$

$$a > 0 \quad \text{min} \quad T\left(-\frac{b}{2a}, _ \right)$$

$$a < 0 \quad \text{max} \quad T\left(-\frac{b}{2a}, _ \right)$$

x_1, x_2

	$a > 0$	$a < 0$
$D > 0$		
$D = 0$		
$D < 0$		

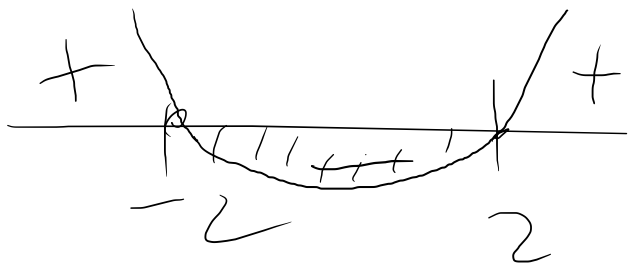
①

$$x^2 - 4 \leq 0$$

$$x^2 - 4 = 0$$

$$x^2 = 4$$

$$x = \pm 2$$



$$x \in [-2, 2]$$

②

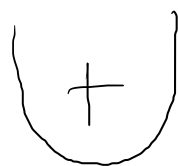
$$x^2 - 4x + 5 \leq 0$$

$$x_{1,2} = \frac{4 \pm \sqrt{16 - 20}}{2}$$

$$= \frac{4 \pm \sqrt{-4}}{2}$$

$$= \frac{4 \pm 2i}{2}$$

$$\left\langle \begin{array}{l} 2+i \\ 2-i \end{array} \right.$$



$$x \in \emptyset$$

ELSPONENCIJALNA
1 FUNKCIJA

JEDNAČINA, NEJEDNAČINA

$$a^x = b, \quad a, b > 0, \quad a \neq 1, \quad a, b \in \mathbb{R}$$

(PR)

$$2^x = 8$$

$$2^x = 2^3$$

$$x = 3$$

$$a^x = a^y \Rightarrow x = y$$

$$a > 1 \quad a^x > a^y \Rightarrow x > y$$

$$0 < a < 1 \quad a^x > a^y \Rightarrow x < y$$

(PR)

$$3^x \leq 27$$

$$3^x \leq 3^3$$

$$x \leq 3$$

$$\left(\frac{1}{3}\right)^x \leq \frac{1}{27} \rightarrow 3^{-x} \leq 3^{-3}$$

$$\left(\frac{1}{3}\right)^x \leq \left(\frac{1}{3}\right)^3$$

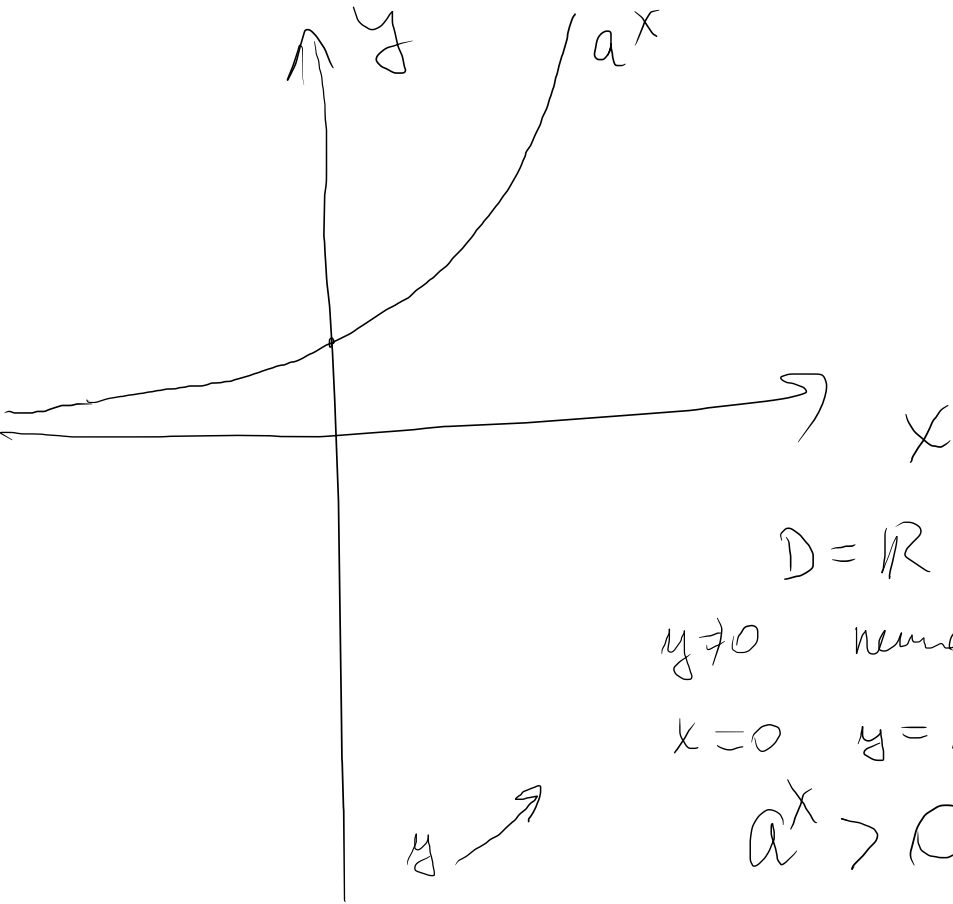
$$x \geq 3$$

$$-x \leq -3$$

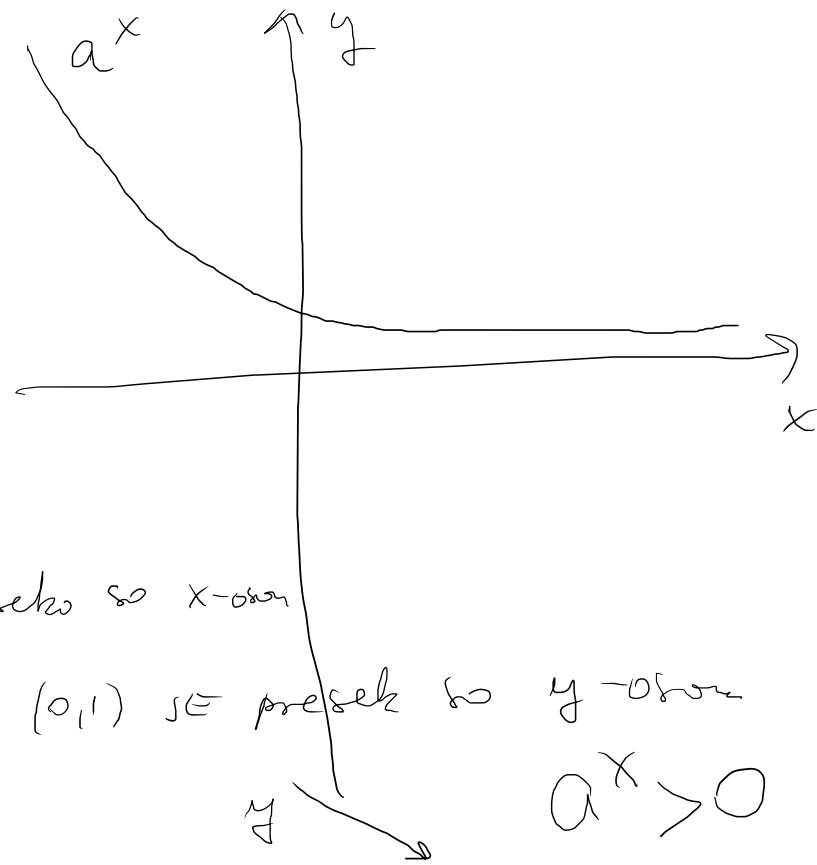
$$x \geq 3$$

$$y = a^x, \quad a > 0, \quad a \neq 1$$

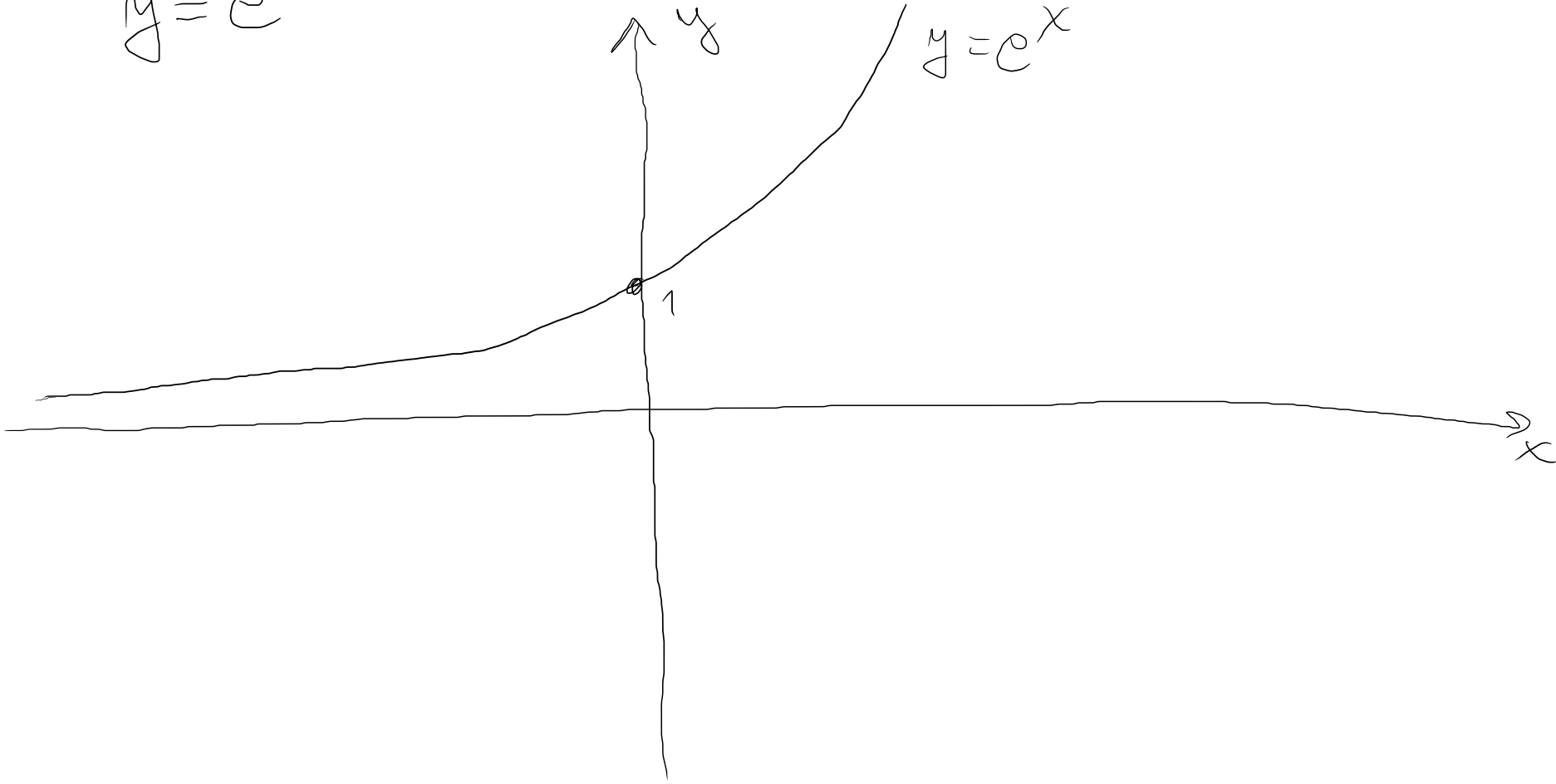
$$a > 1$$



$$0 < a < 1$$



$$y = e^x$$



$$\boxed{x = \log_a b \iff a^x = b}, \quad a > 0, a \neq 1, b > 0$$

$$\log_5 3 = x \iff 5^x = 3$$

$$\log x = 100 \implies x = 10^{100}$$

$$x > 0, y > 0, a > 0, a \neq 1$$

$$1, a^{\log_a x} = x$$

$$2, \log_a a^x = x$$

$$3, \log_a(xy) = \log_a x + \log_a y$$

$$4, \log_a \frac{x}{y} = \log_a x - \log_a y$$

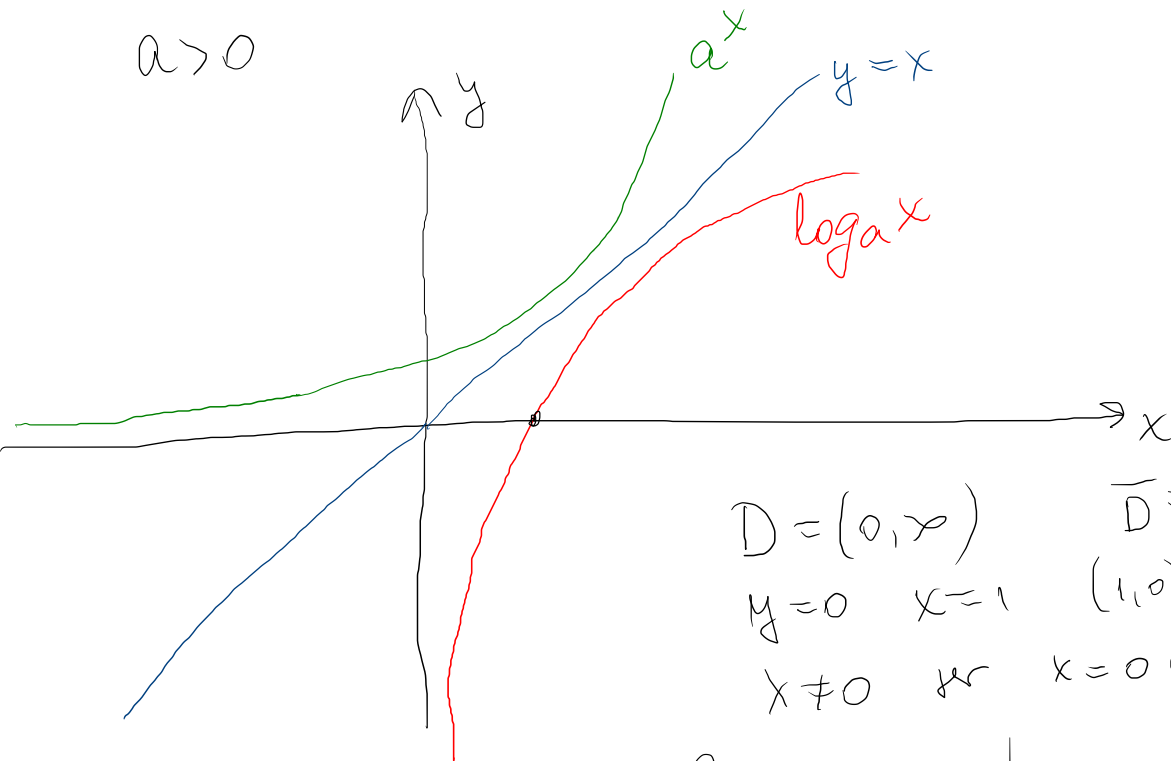
$$5, \log_a x^s = s \log_a x$$

$$6, \log_a 1 = 0$$

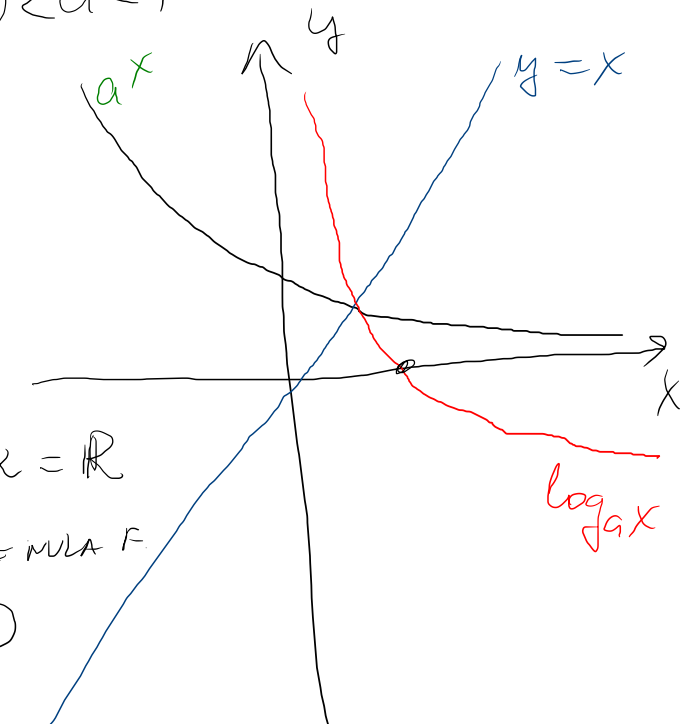
$$7, \log_a a = 1$$

$$y = \log_a x, \quad a > 0, \quad a \neq 1, \quad x > 0$$

$a > 0$



$0 < a < 1$



$$D = (0, \infty)$$

$$\bar{D} = \mathbb{R} = \mathbb{R}$$

$$y = 0 \quad x = 1$$

$(1, 0) \neq \text{MUL A F}$

$$x \neq 0 \quad \text{or} \quad x = 0 \notin D$$

$y < 0$ for $x \in (0, 1)$, $y > 0$ for $x \in (1, \infty)$

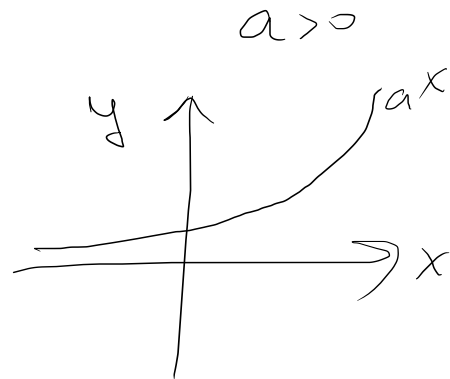
$y < 0$ for $x \in (0, 1)$, $y > 0$ for $x \in (1, \infty)$

$$a^x: \mathbb{R} \rightarrow (0, \infty)$$

$$a^x$$

$$D = \mathbb{R}$$

$$\bar{D} = (0, \infty)$$

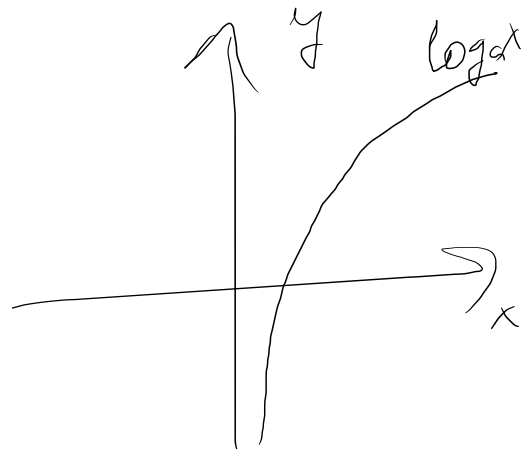


$$\log_a x: (0, \infty) \rightarrow \mathbb{R}$$

$$\log_a x$$

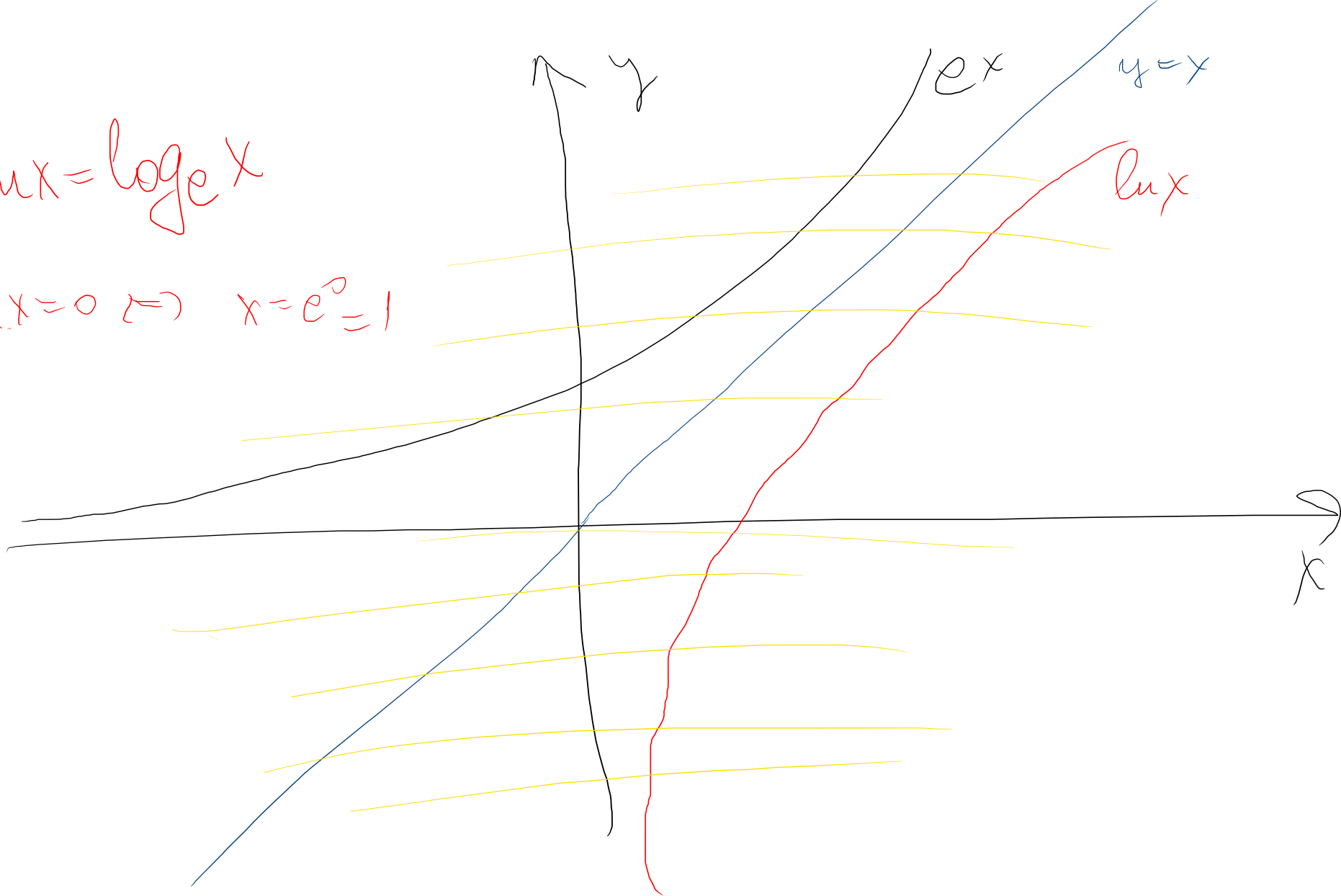
$$D = (0, \infty)$$

$$\bar{D} = \mathbb{R}$$



$$\ln x = \log_e x$$

$$\ln x = 0 \Rightarrow x = e^0 = 1$$



$$\ln x = a \Leftrightarrow x = e^a$$

$$\ln x = 5 \Rightarrow x = e^5$$

$$\log_a x = \log_a y \Leftrightarrow x = y$$

$$\log_a x \geq \log_a y$$

$$a > 1$$

$$x \geq y$$

$$0 < a < 1$$

$$x \leq y$$

$$\log_2 x \geq \log_2 5$$

$$x \geq 5$$

$$\log_{\frac{1}{2}} x \geq \log_{\frac{1}{2}} 5$$

$$x \leq 5$$