Lana Kučko

Linearne jednadžbe i linearne nejednadžbe

95.str.

7/1

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

$x = ?$

$$y = \frac{1-3x}{1+3x} \quad / \cdot (1+3x) \neq 0$$

$3x = -1$

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

$$y(1+3x) = 1-3x$$

$$y + 3xy = 1 - 3x$$

$$3xy + 3x = 1 - y$$

$$x(3y-3) = 1-y \quad / : (3y+3)$$

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

97.str.

17/8

$$\frac{3x-1}{12x-15} + \frac{15}{32x^2-50} = \frac{2x+1}{8x+10} \quad / \cdot 6(4x-5)(4x+5) \neq 0$$

$\frac{3x-1}{3(4x-5)}$ $\quad \frac{15}{2(16x^2-25)}$ $\quad \frac{2x+1}{2(4x+5)}$

$(4x-5)(4x+5)$

$x \neq \frac{5}{4}$ $\quad x \neq -\frac{5}{4}$

$$2(4x+5)(3x-1) + 15 \cdot 3 = 3(4x-5)(2x+1)$$

$$24x^2 - 8x + 30x - 10 + 45 = 24x^2 + 12x - 30x - 15$$

$$-8x + 30x - 12x + 30x = -15 + 10 - 45$$

$$40x = -50$$

$x = -\frac{5}{4}$! nema rješenja!

21/5

$$\frac{-3}{2x+5} \geq 0$$



$2x + 5 < 0$

$2x < -5 \quad / :2$

$\boxed{x < -\frac{5}{2}}$

$x \in \left\langle -\infty, -\frac{5}{2} \right\rangle$

21/7

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



$-x + 1 > 0$

$-x > -1 \quad / : (-1)$

$\boxed{x < 1}$

96. str.

18/2

$$a^2(x-1) = 2ax - 4$$

$$a^2x - a^2 = 2ax - 4$$

$$a^2x - 2ax = a^2 - 4$$

dijeljenje kako bi dobili samo x s lijeve strane

$$ax(a-2) = (a-2)(a+2) \;/:\; a(a-2) \neq 0$$

izlučivanje, formule

$a \neq 0 \qquad a \neq 2$

I a $a \neq 0$, $a \neq 2$

$$x = \frac{(a-2)(a+2)}{a(a-2)}$$

$$x = \frac{a+2}{a}$$

I a $a = 0$

$$x = \frac{(0-2)(0+2)}{0 \cdot (0-2)}$$

$$x = \frac{-4}{0}$$

nema rješenja

I a $a = 2$

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

$$x = \frac{0}{0}$$

neodredeno

18/4

$$9a^2(x+1) = 4 + 6ax$$

$$9a^2x + 9a^2 = 4 + 6ax$$

$$9a^2x - 6ax = 4 - 9a^2$$

$$3ax(3a-2) = (2-3a)(2+3a)$$

$3a \cdot x(3a-2) = -(3a-2)(2+3a) \;/: 3a(3a-2) \neq 0$

$x = -\frac{2+3a}{3a}$

$3a \neq 0 \qquad 3a-2 \neq 0$

$a \neq 0 \qquad 3a \neq 2$

$a \neq \frac{2}{3}$

1a $a \neq 0 \quad a \neq \frac{2}{3}$

$$x = -\frac{2+3a}{3a}$$

1a $a = 0$

$$x = \frac{-((3\cdot 0)-2)(2+(3\cdot 0))}{3\cdot 0((3\cdot 0)-2)}$$

$$x = \frac{0-2}{0}$$

$x = -\frac{2}{0}$ nema rješenja

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

$$x = \frac{-\left(\left(3\cdot\frac{2}{3}\right)-2\right)\left(2+\left(3\cdot\frac{2}{3}\right)\right)}{3\cdot\frac{2}{3}\left(\left(3\cdot\frac{2}{3}\right)-2\right)}$$

$x = \frac{0}{0}$ neodređena

18/5

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

$a^2x - a^2 = ax - 1$

$a^2x - ax = -1 - a^2$

$ax(a-1) = (a-1)(a+1) \;/: a(a-1) \neq 0$

$a \neq 0 \qquad a \neq 1$

$$x = \frac{(a-1)(a+1)}{a(a-1)}$$

97. str.

17/2

$$\frac{x+5}{x^2-5x} - \frac{x-5}{2x^2-10x} = \frac{x+25}{2x^2-50}$$ ← izlučivanje formule kraćenje

$$\frac{x+5}{x(x-5)} - \frac{x-5}{2x(x-5)} = \frac{x+25}{2(x^2-25)} \quad / \cdot 2x(x-5)(x+5) \neq 0$$

ne smiješ množiti s nulom

$2x \neq 0$ → $x \neq 0$; $x-5 \neq 0$ → $x \neq 5$; $x+5 \neq 0$ → $x \neq -5$ — uvjeti

$$2(x+5) - 1(x-5)(x+5) = x^2 + 25x$$

rješi se zagrada

$$2x^2 + 20x - 50 - x^2 + 25 = x^2 + 25x$$

$$75 = 5x \quad / :5$$ ← nepoznanice na jednu stranu

$$x = 15$$

provjeri s uvjetima

17/3

$$\frac{x+3}{2x^2-6x} - \frac{x-3}{3x^2+9x} = \frac{x}{6x^2-54}$$

$$\frac{x+3}{2x(x-3)} - \frac{x-3}{3x(x+3)} = \frac{x}{6(x^2-9)} \quad / \cdot 6x(x-3)(x+3) \neq 0$$

$6(x-3)(x+3)$

$6x \neq 0$ → $x \neq 0$; $x-3 \neq 0$ → $x \neq 3$; $x+3 \neq 0$ → $x \neq -3$

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

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

$3(x^2+6x+9) - 2(x^2-6x+9) = x^2$

$3x^2 + 18x + 27 - 2x^2 + 12x - 18 = x^2$

$30x = -9$

$\boxed{x = -\frac{3}{10}}$

17/4

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

$$\frac{x-1}{x(2x+1)} - \frac{2x}{x(2x-1)} = \frac{3-2x}{(2x-1)(2x+1)} \quad / \cdot x(2x-1)(2x+1) \neq 0$$

$x \neq 0$

$2x-1 \neq 0$ $\qquad$ $2x+1 \neq 0$

$2x \neq 1$ $\qquad$ $2x \neq -1$

$x \neq \frac{1}{2}$ $\qquad$ $x \neq -\frac{1}{2}$

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

$2x^2 - x - 2x + 1 - 4x^2 - 2x = 3x - 2x^2$

$-8x = -1$

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

103. strana

4/

minute automobili

$\downarrow$ 25 8 $\downarrow$

x 12

$\frac{25}{x} = \frac{8}{12}$

$8x = 300 / :8$

$x = 37,5$ minuta

19/

$x + y = 30 \rightarrow x = 30 - y$

$x^2 - y^2 = 120$

$(30-y)^2 - y^2 = 120$

$\boxed{y = 13}$

$x^2 - 13^2 = 120$

$x^2 = 289 / \sqrt{\ }$

$\boxed{x = 17}$

12/

12 odlikaša što je 37.5% od svih učenika

broj učenika u razredu = ?

$x \cdot 0.375 = 12$

$0.375x = 12 / :0.375$

$x = 32$ učenika

13/

$$\begin{array}{r} 100 \\ -\ 15 \\ \hline 85 \end{array}$$

$0.85x = 204 / :0.85$

$x = 240$ kn

17/5

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

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

$\cdot (2x-1)(1+2x)$

$x \neq 0 \qquad 2x-1 \neq 0 \qquad 2x+1 \neq 0$

$2x \neq 1 \qquad 2x \neq -1$

$x \neq \frac{1}{2} \qquad x \neq -\frac{1}{2}$

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

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

$x = 0$ nema rješenja

103. str.

1/

$t_1 = 4h$

$s_1 = 3200km$

$t_2 = 5h$

$s_2 = ?$

h	km
4 ↓	3200 ↓
5	x

proporcionalno

$$\frac{4}{5} = \frac{3200}{x}$$

$4x = 16\,000 / :4$

$x = 4000km$

152 str.

24/



$o = 2a + 2b$

$o = 52\,cm$

$b = a - 6$

$P = ?$

$P = a \cdot b$

$P = 16 \cdot 10$

$P = 160\,cm^2$

$52 = 2a + 2(a-6)$

$52 = 2a + 2a - 12$

$64 = 4a \;/:4$

$a = 16\,cm$

$b = 16 - 6$

$b = 10\,cm$

25/



$o = 2a + 2b$

$o = 80\,m$

$b = a - 5$

$b = 22.5 - 5$

$b = 17.5\,m$

$P = ?$

$P = a \cdot b$

$P = 22.5 \cdot 17.5$

$P = 393.75\,m^2$

$80 = 2a + 2(a-5)$

$80 = 2a + 2a - 10$

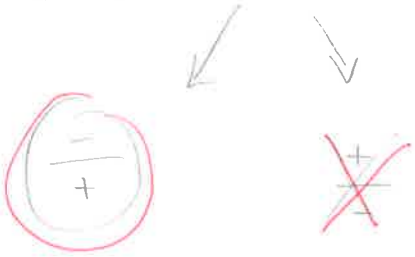
$90 = 4a \;/:4$

$a = 22.5\,m$

21/6

$$\frac{2-3x}{x^2-4x+4} < 0$$

$$\frac{2-3x}{(x-2)^2} < 0$$



$2-3x > 0$

$-3x > -2 \;/:(-3)$

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

$x \in \left\langle \frac{2}{3}, +\infty \right\rangle$

~~27~~/3

$$\frac{x-1}{(x+2)(x+3)} < 0$$

	$-\infty$		-3		-2		1		$+\infty$
$x=1$ $x-1$		−		−		−	0	+	
$x=-2$ $x+2$		−		−	0	+		+	
$x=-3$ $x+3$		−	0	+		+		+	
		−		+		−		+	

$x \in \langle -\infty, 3 \rangle \cup \langle -2, 1 \rangle$

grupa zadataka 0

0/1

$$\frac{2x-3}{3} = \frac{x}{2} - \frac{x-1}{6} \quad / \cdot 6$$

$$24 - 2(2x-3) = 3x - (x-1)$$

$$24 - 4x + 6 = 3x - x + 1$$

$$29 = 6x \quad / : 6$$

$$x = \frac{29}{6}$$

0/2

$$\frac{(x-1)(x+1)}{3} - \frac{(2x+1)^2}{12} = 1\frac{1}{4} - x$$

$$\frac{(2-1)(2+1)}{3} - \frac{(4+1)^2}{12} = \frac{5}{4} - 2$$

$$\frac{3}{3} - \frac{16+8+1}{12} = \frac{5}{4} - \frac{2}{1}$$

$$\frac{3\cdot 4}{3\cdot 4} - \frac{25}{12} = \frac{5\cdot 3}{4\cdot 3} - \frac{2\cdot 12}{1\cdot 12}$$

$$\frac{-13}{12} = \frac{-9}{12}$$

$$\frac{12}{12} - \frac{25}{12} = \frac{15}{12} - \frac{24}{12}$$

2 nije rješenje

1/1

$$4(x-1)(x-3) - 3(x+1) = (2x-3)^2$$

$$4x^2 - 12x - 4x + 12 - 3x - 3 = 4x^2 - 12x + 9$$

$$-7x = 0 \;/:(-7)$$

$$x = 0$$

2/1

$$\frac{x+5}{3x-6} = \frac{1}{2} + \frac{2x-3}{2x-4}$$

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

$$2x + 10 = 3x - 6 + 6x - 9$$

$$25 = 7x \;/:7$$

$$x = \frac{25}{7}$$

5/1

$$(5x-7)(7x-5) \geq 0$$

$x = \frac{7}{5}$

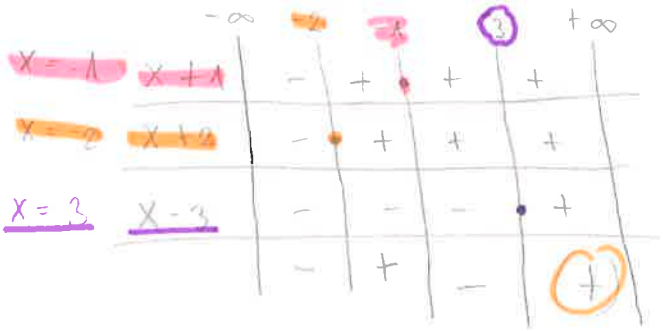
$x = \frac{5}{7}$

	$-\infty$		$\frac{5}{7}$		$\frac{7}{5}$		$+\infty$
$5x-7$		$-$		$-$	0	$+$	
$7x-5$		$-$	0	$+$		$+$	
		$+$	0	$-$	0	$+$	

$$x \in \left\langle -\infty, \frac{5}{7} \right] \cup \left[\frac{7}{5}, +\infty \right\rangle$$

5/2

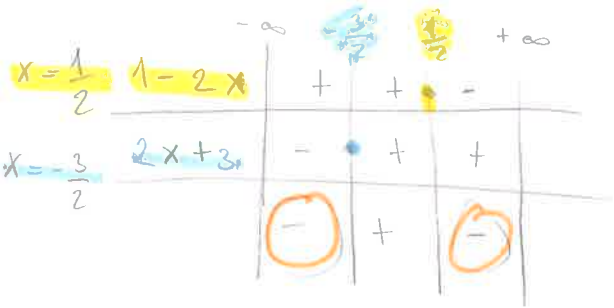
$$\frac{(x+1)(x+2)}{(x-3)} > 0$$



$$x \in \langle -2, -1 \rangle \cup \langle 3, +\infty \rangle$$

6/1

$$\frac{1-2x}{2x+3} \leq 0$$



$$x \in \left\langle -\infty, -\frac{3}{2} \right\rangle \cup \left[\frac{1}{2}, +\infty \right\rangle$$

6/2

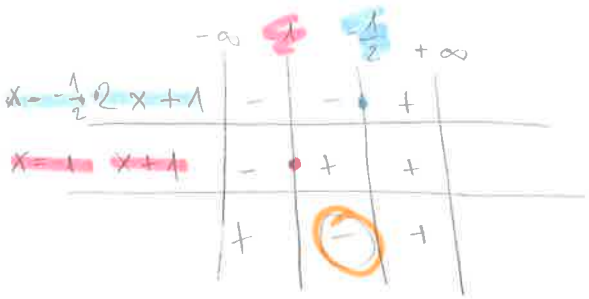
$$\frac{x^2+2x}{x+1} \leq x+1$$

$$\frac{2x+1}{x+1} \leq 0$$

$$\frac{x^2+2x}{x+1} - x - 1 \leq 0$$

$$(x-1)(x+1)$$

$$\frac{x^2+2x-x^2+1}{x+1} \leq 0$$



$$x \in \left\langle -1, -\frac{1}{2} \right]$$

7/1

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

$$\frac{2x+1}{x+3} - \frac{x-3}{2x-1} \geq 0 \quad / \cdot (x+3)(2x-1)$$

$$\frac{(2x+1)(2x-1) - (x-3)(x+3)}{(x+3)(2x-1)} \geq 0$$

$$\frac{2x^2 - 1 - (x^2 - 9)}{(x+3)(2x-1)} \geq 0$$

$$\frac{3x^2 + 8}{(x+3)(2x-1)} \geq 0 \qquad 3x^2 + 8 > 0$$

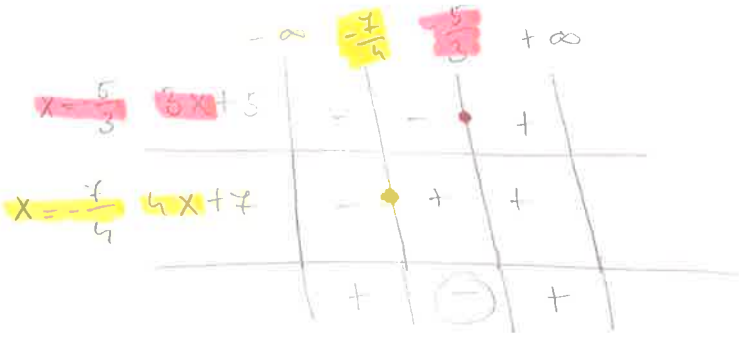
	$-\infty$		-3		$\frac{1}{2}$		$+\infty$
$x+3$		$-$	0	$+$		$+$	
$2x-1$		$-$		$-$	0	$+$	
		$+$	‖	$-$	‖	$+$	

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

$$x \in \langle -\infty, -3 \rangle \cup \langle \frac{1}{2}, +\infty \rangle$$

22/4

167. str. $(3x+5)(4x+7) \leq 0$



$x \in \left[-\frac{7}{4}, -\frac{5}{3}\right]$

• sve između $-\frac{7}{4}$ i $-\frac{5}{3}$ i oni

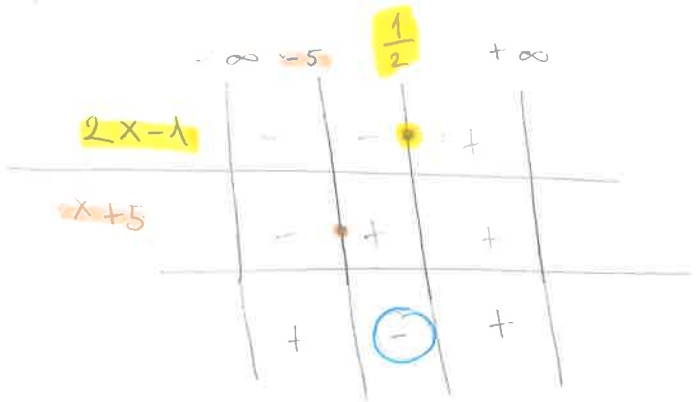
22/2

$(2x-1)(x+5) \leq 0$

$2x=1$

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

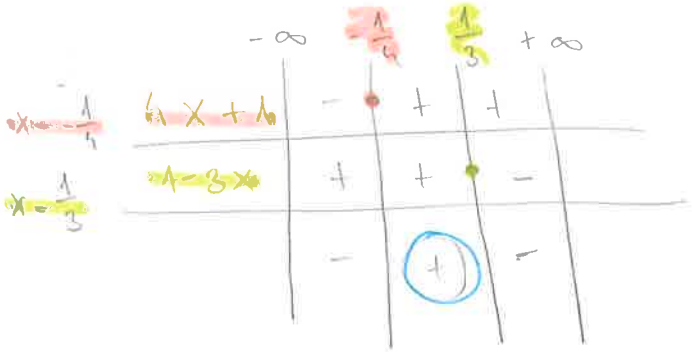
$x=-5$



$x \in \left[-5, \frac{1}{2}\right\rangle$

22/3

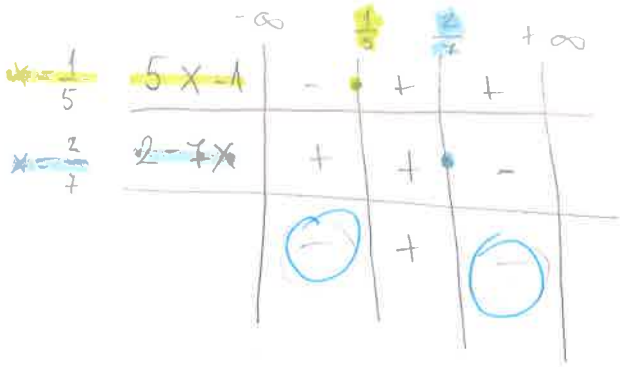
$(4x+1)(1-3x) > 0$



$x \in \left\langle -\frac{1}{4}, \frac{1}{3}\right]$

22/5

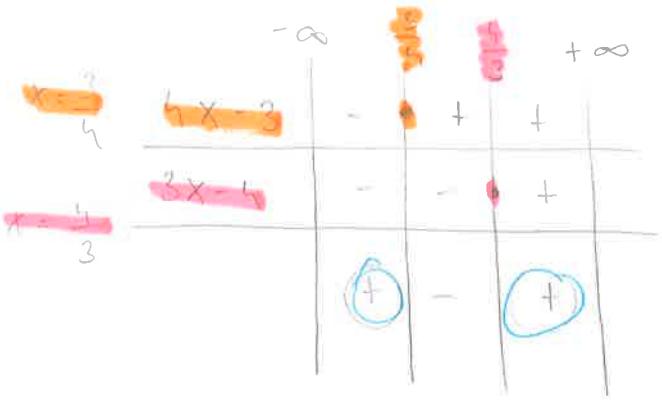
$$(5x-1)(2-7x) \leq 0$$



$$x \in \left\langle -\infty, \frac{1}{5} \right\rangle \cup \left\langle \frac{2}{7}, +\infty \right\rangle$$

22/6

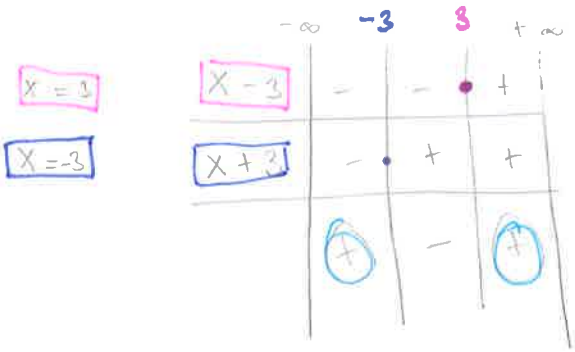
$$(4x-3)(3x-4) \geq 0$$



$$x \in \left\langle -\infty, \frac{3}{4} \right] \cup \left[\frac{4}{3}, +\infty \right\rangle$$

23/1

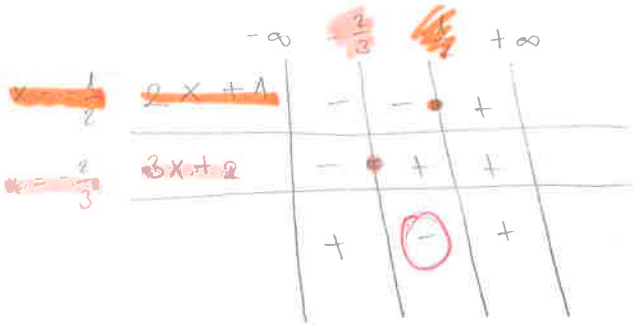
$$\frac{x-3}{x+3} \geq 0$$



$$x \in \left\langle -\infty, -3 \right\rangle \cup \left[3, +\infty \right\rangle$$

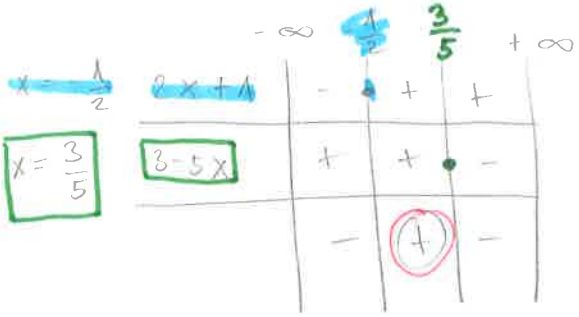
23/2

$$\frac{2x+1}{3x+2} \leq 0$$



23/4

$$\frac{2x+1}{3-5x} \geq 0$$



listić sa sata

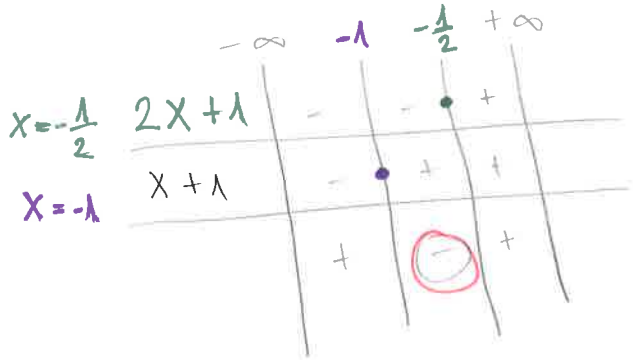
6/2

$$\frac{x^2+2x}{x+1} \leq x+1$$

$$\frac{x^2+2x}{x+1} - x - 1 \leq 0$$

$$\frac{x^2+2x-(x-1)(x+1)}{x+1} \leq 0$$

$$\frac{2x+1}{x+1} \leq 0$$



25/5

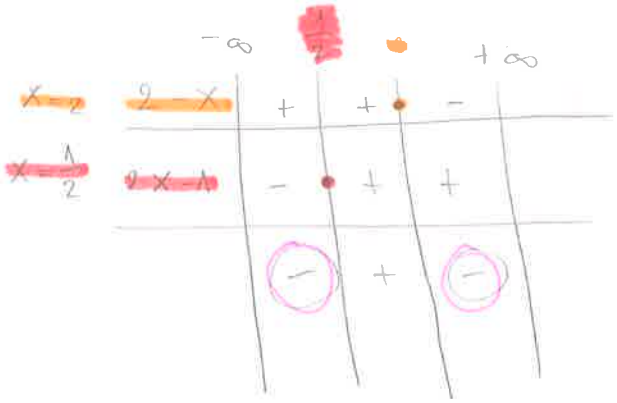
$$\frac{x+1}{2x-1} \leq 1$$

$$\frac{x+1}{2x-1} - 1 \leq 0$$

$$\frac{x+1-(2x-1)}{2x-1} \leq 0$$

$$\frac{x+1-2x+1}{2x-1} \leq 0$$

$$\frac{2-x}{2x-1} \leq 0$$



$$x \in \left\langle -\infty, \frac{1}{2} \right\rangle \cup \left\langle 2, +\infty \right\rangle$$