Ex:

$$\frac{x^3+3x^2-4}{x^2+2x+1} = \underbrace{x+1}_{\text{kvot}} + \frac{\overbrace{-3x-5}^{\text{rest}}}{x^2+2x+1}$$

Polynomdivision

$$\begin{array}{r|l} & \overbrace{x+1}^{\text{kvot}} \\ \hline x^2+2x+1 & x^3+3x^2-4 \\ & -(x^3+2x^2+x) \\ \hline & x^2-x-4 \\ & -(x^2+2x+1) \\ \hline & \underbrace{-3x-5}_{\text{rest}} \end{array}$$

Ex $x^3-7x+\underline{6}=0$

Tal som delar 6: $\underline{1}, -1, 2, -2, 3, -3, 6, -6$

Testa med dem som x ger $x=1$

Dividera

$$\frac{x^3-7x+6}{x-1} = x^2+x-6$$

$$\begin{array}{r|l} & x^2+x-6 \\ \hline x-1 & x^3-7x+6 \\ & -(x^3-x^2) \\ \hline & x^2-7x+6 \\ & -(x^2-x) \\ \hline & -6x+6 \\ & -(-6x+6) \\ \hline & 0 \end{array}$$

$$x^3-7x+6 = (x-1)(x^2+\overset{1\cdot x}{x}-6)$$
$$= (x-1)(x+3)(x-2)$$

$x=1$ el. $x=-3$ el. $x=2$

Olikheter

Ex: $5x+2 > 2x-1$

Addera/subtrahera ekv!

Division/mult. se upp!!

$5x+3 > 2x$

$3 > -3x$

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

$x > -1$

alt. $5x+2 > 2x-1$

$3x > -3$

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

$x > -1$

Ex:

- $2x-4 > 2$

  $2x > 6$

  $x > 3$

- $-3x+2 > -2$

  $-3x > -4$

  $x < \frac{-4}{-3} = \frac{4}{3}$

- $x-5 < 2x+3$

  $-8 < x$

Ex: $(x-1)(x+3) \leq 0$

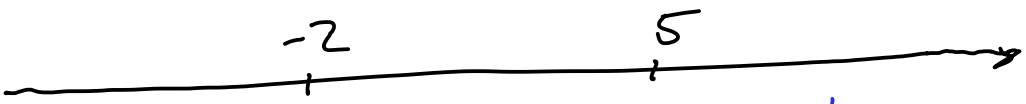
$x-1$	$-$		$-$	0	$+$
$x+3$	$-$	0	$+$		$+$
$(x-1)(x+3)$	$+$	0	$-$	0	$+$

$$-3 \leq x \leq 1 \qquad x \in [-3, 1]$$

Ex: $x^2 > 3x + 10$

$x^2 - 3x - 10 > 0$

$(x+2)(x-5) > 0$



$x+2$	$-$	0	$+$		$+$
$x-5$	$-$		$-$	0	$+$
$(x+2)(x-5)$	$+$	0	$-$	0	$+$

$x < -2$ eller $x > 5$

$x \in (-\infty, -2) \cup (5, \infty)$

9 $1 < 2x + 5 < 5$ $\qquad 1 < 2x+5$ och $2x+5 < 5$

$1 - 5 < 2x < 5 - 5$

$-4 \qquad 0$

$-2 < x < 0$

Ex:

$$\frac{3}{x-1} < -\frac{2}{x}$$

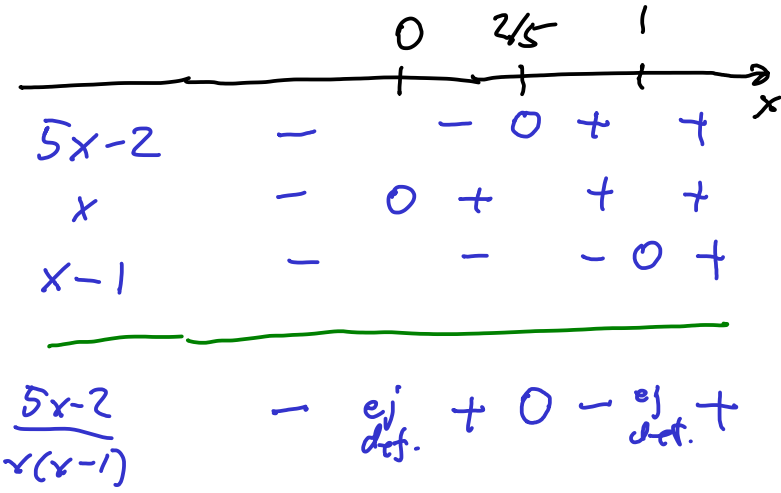
mgs: $x(x-1)$

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

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

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

$$\frac{5x-2}{x(x-1)} < 0$$



$x < 0$ eller $\frac{2}{5} < x < 1$

$x \in (-\infty, 0) \cup (\frac{2}{5}, 1)$

Rep L2

$$\frac{x}{2} \geq 1 + \frac{4}{x}$$

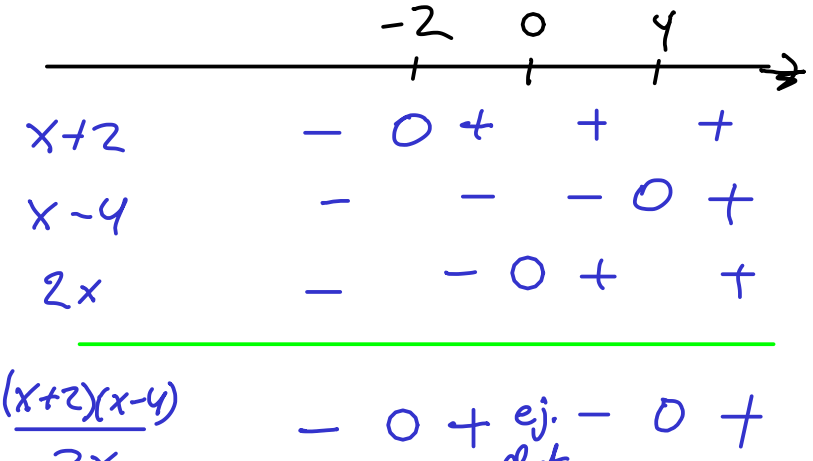
mgs: $2x$

$$\frac{x}{2} - 1 - \frac{4}{x} \geq 0$$

$$\frac{x^2}{2x} - \frac{2x}{2x} - \frac{8}{2x} \geq 0$$

$$\frac{x^2-2x-8}{2x} \geq 0$$

$$\frac{(x+2)(x-4)}{2x} \geq 0$$



$-2 \leq x < 0$ eller $x \geq 4$

$x \in [-2, 0) \cup [4, \infty)$

Ex: Största värde av $f(x) = 2x - 1 - 2x^2$

$$f(x) = 2x - 1 - 2x^2 = -2x^2 + 2x - 1 = (-2)(x^2 - x + \tfrac{1}{2})$$

$$= (-2)\left[(x - \tfrac{1}{2})^2 - \tfrac{1}{4} + \tfrac{2}{4}\right] = (-2)\left[(x - \tfrac{1}{2})^2 + \tfrac{1}{4}\right]$$

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

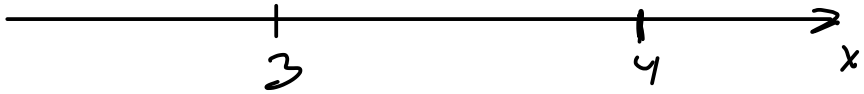
$$= (-2)(x - \tfrac{1}{2})^2 - \tfrac{1}{2}$$

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

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

Största värde på $f(x)$: $-\frac{1}{2}$ inträffar då $x = \frac{1}{2}$

Ex:



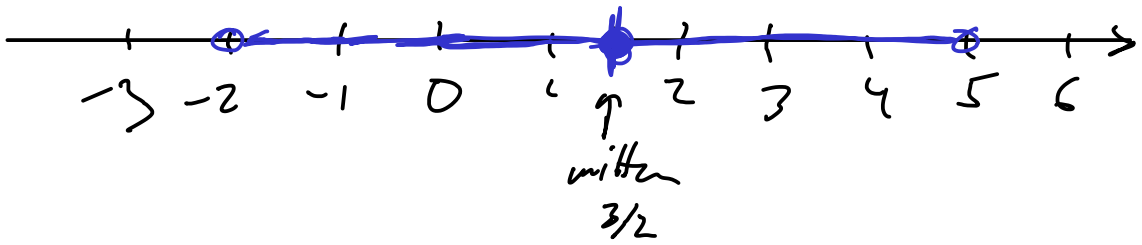
Ex: $|x + 9| < 7$

$|x - (-9)| < 7$

Avståndet mellan x och -9 är mindre än 7.

$-16 < x < -2$ $\quad x \in (-16, -2)$

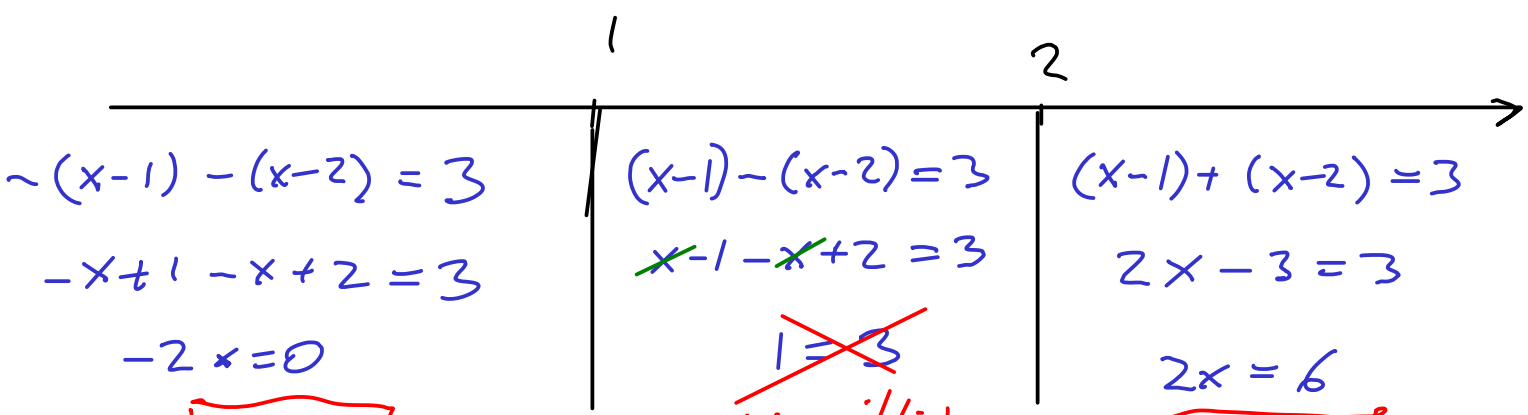
Ex: $-2 < x < 5$ Beskriv med $|x-a| < b$



$$|x - \tfrac{3}{2}| < \tfrac{7}{2}$$

Ex: $|x-1| + |x-2| = 3$

$$|x-1| = \begin{cases} x-1 & x-1 \geq 0 \\ -(x-1) & x-1 < 0 \end{cases}$$



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

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

$-2x=0$

$x=0$

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

$x-1-x+2=3$

$1=3$

ej giltigt för något x

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

$2x-3=3$

$2x=6$

$x=3$