

INEQUALITIES INVOLVING QUADRATIC FUNCTIONS

$$x^2 - 4x - 12 \leq 0$$

STEP 1 Take the expression equal to zero and solve the obtained equation

$$x^2 - 4x - 12 = 0$$

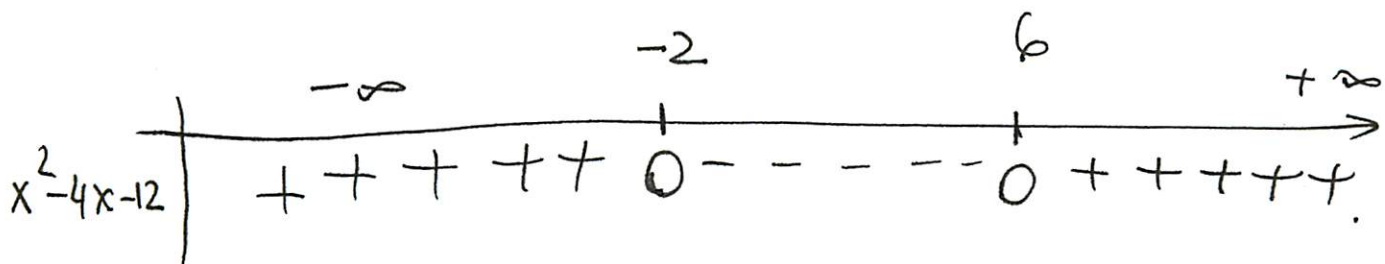
$$(x-6)(x+2) = 0$$

$$x-6 = 0 \Rightarrow x = 6$$

$$x+2 = 0 \Rightarrow x = -2$$

$$\begin{matrix} (6,0) \\ (-2,0) \end{matrix} \left. \vphantom{\begin{matrix} (6,0) \\ (-2,0) \end{matrix}} \right\} x\text{-intercepts.}$$

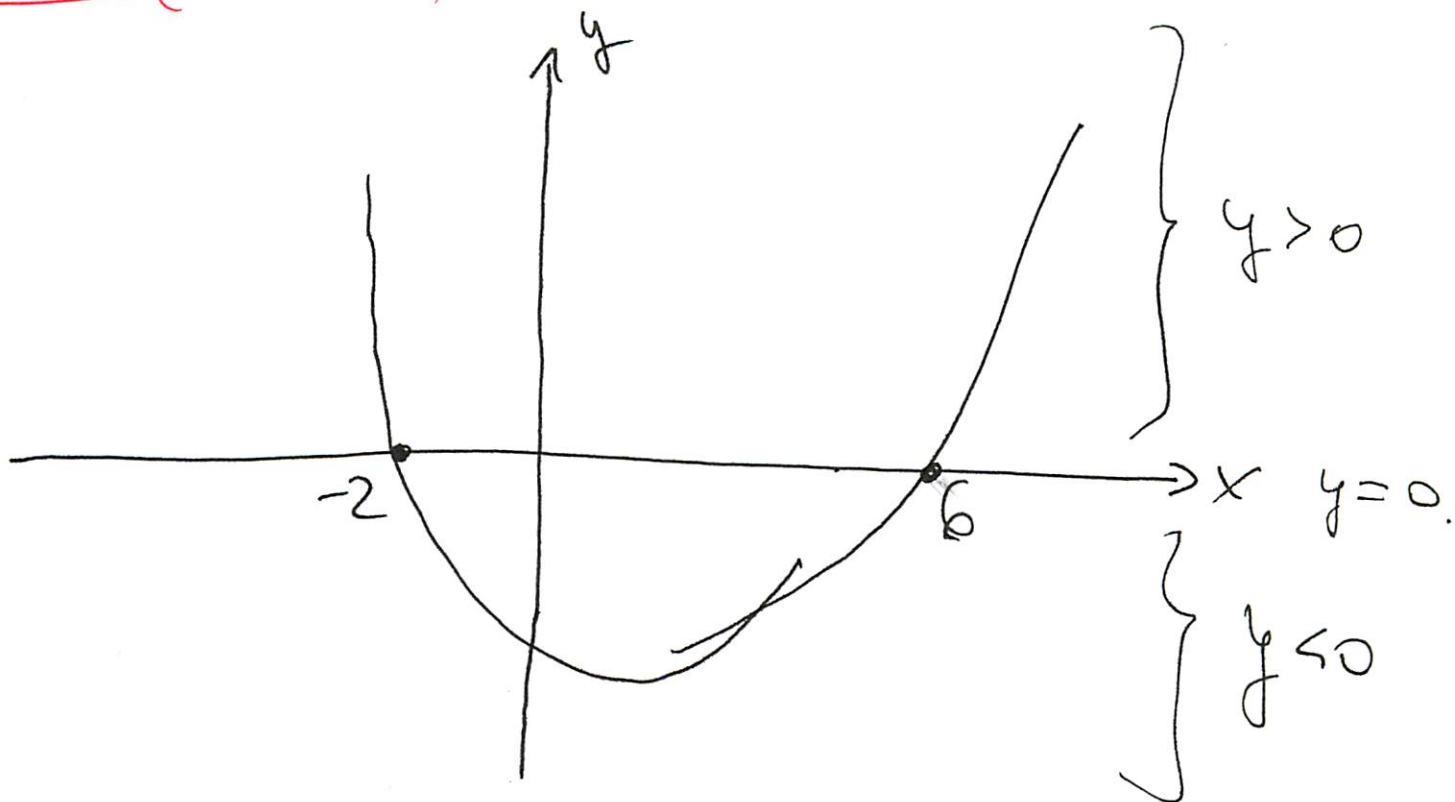
STEP 2 a (Method 1)



STEP 3 (Answer) discuss the inequality sign.

$$x \in [-2, 6]$$

STEP 26 (Method 2)



$$x \in [-2, 6]$$

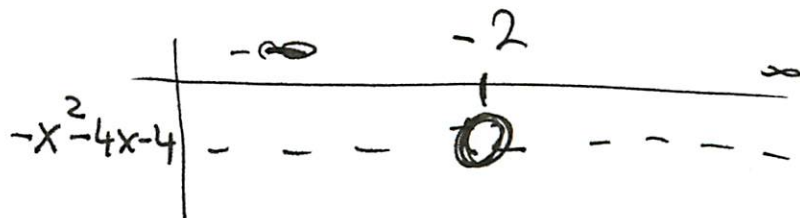
Ex! $-x^2 - 4x - 4 < 0$

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

$$-(x^2 + 4x + 4) \geq 0$$

$$-(x+2)^2 \geq 0.$$

$$x = -2$$



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

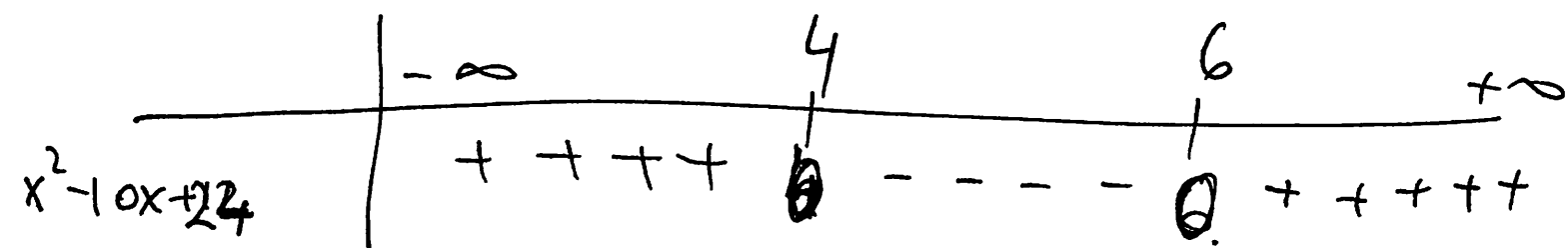
$$\text{Ex: } x^2 - 10x + 24 \geq 0$$

$$x^2 - 10x + 24 = 0$$

$$(x-6)(x-4) = 0$$

$$x-6=0 \Rightarrow x=6$$

$$x-4=0 \Rightarrow x=4$$



$$x \in (-\infty, 4] \cup [6, \infty)$$

$$\text{Ex: } 3x^2 \geq 14x + 5$$

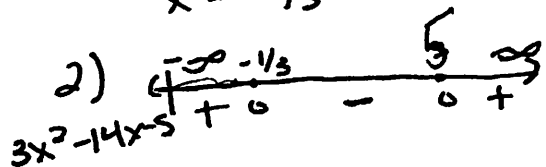
$$3x^2 - 14x - 5 \geq 0$$

$$1) 3x^2 - 14x - 5 = 0$$

$$(3x+1)(x-5) = 0$$

$$x = 5$$

$$x = -1/3$$



$$3) x \in (-\infty, -1/3] \cup [5, \infty)$$