

q.2 Quadratic Inequalities.

ex 1 Solve $x^2 - 2x - 3 \leq 0$

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

$$\begin{array}{ccc} \uparrow & \uparrow & \\ x=3 & x=-1 & \text{(roots)} \end{array}$$

step 1: factor / find roots.

$$\text{(solve } x^2 - 2x - 3 = 0)$$

step 2: put roots on a number line



check 0 0 - 0 - 3
 -3

step 3: check a point (not a root)



step 4: completing a sign diagram

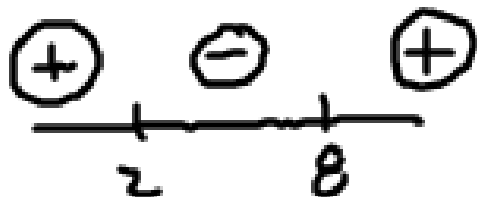
step 5: answer $-1 \leq x \leq 3$

$$[-1, 3]$$

ex 2 Solve $x^2 - 10x + 16 \leq 0$

$$(x-8)(x-2) \leq 0$$

$$\begin{array}{cc} \downarrow & \downarrow \\ x=8 & x=2 \end{array}$$



$$[2, 8]$$

$$x^2 - 10x + 16 = 0$$

$$2 \leq x \leq 8$$

ex 3 Solve

$$-x^2 + x + 12 < 0$$

$$\boxed{x^2 - x - 12 > 0}$$

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

$$\begin{array}{cc} \downarrow & \downarrow \\ 4 & -3 \end{array}$$

$$\begin{array}{ccc} \oplus & \ominus & \oplus \\ | & | & \\ -3 & 4 & \end{array}$$

$$x < -3 \text{ OR } x > 4$$

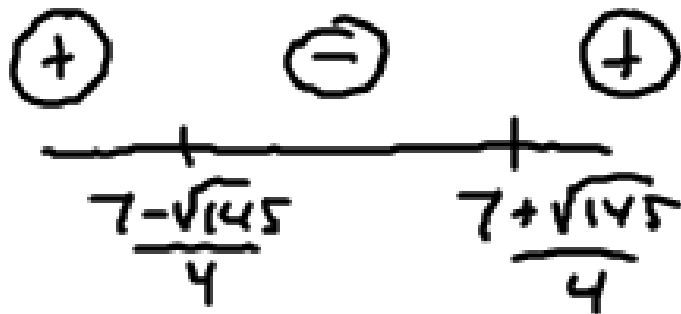
$$\begin{array}{l} -x^2 + x + 12 = 0 \\ \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \end{array}$$

$$(-\infty, -3) \cup (4, \infty)$$

ex4 Solve $2x^2 - 7x > 12$

$$2x^2 - 7x - 12 > 0$$

$(2x \quad)(x \quad)$ doesn't factor



$$x < \frac{7 - \sqrt{145}}{4} \text{ OR } x > \frac{7 + \sqrt{145}}{4}$$

$$\left(-\infty, \frac{7 - \sqrt{145}}{4}\right) \cup \left(\frac{7 + \sqrt{145}}{4}, \infty\right)$$

$$2x^2 - 7x - 12 = 0$$

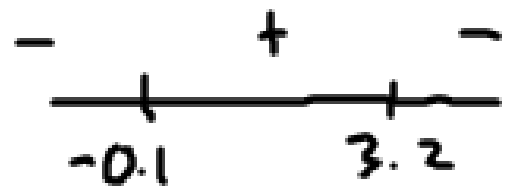
$$\frac{7 \pm \sqrt{49 + 96}}{4}$$

$$\frac{7 \pm \sqrt{145}}{4}$$

$$\frac{7 - \sqrt{145}}{4}, \frac{7 + \sqrt{145}}{4}$$

ex 5 (ex 4 pg 483)

$$-4.9t^2 + 15t + 2 > 0$$



↑
implies $(-0.1, 3.2)$

baseball in flight $(0, 3.2)$

$$-4.9t^2 + 15t + 2 = 0$$

* quad. formula.

* complete square

$$Y_1 = -4.9t^2 + 15t + 2$$

$$Y_2 = 0$$

calc intersect

$-0.1, 3.2$

* 4-9 pg 485