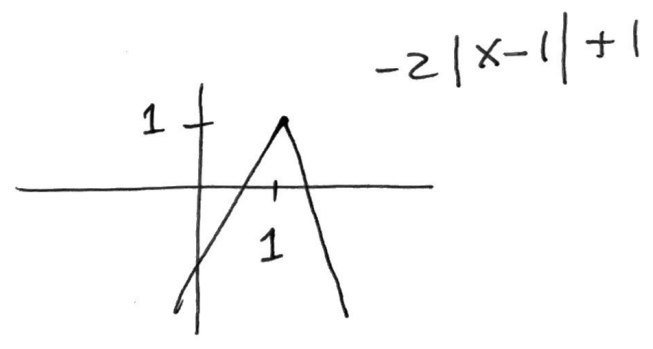
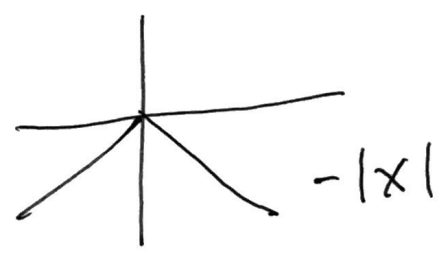
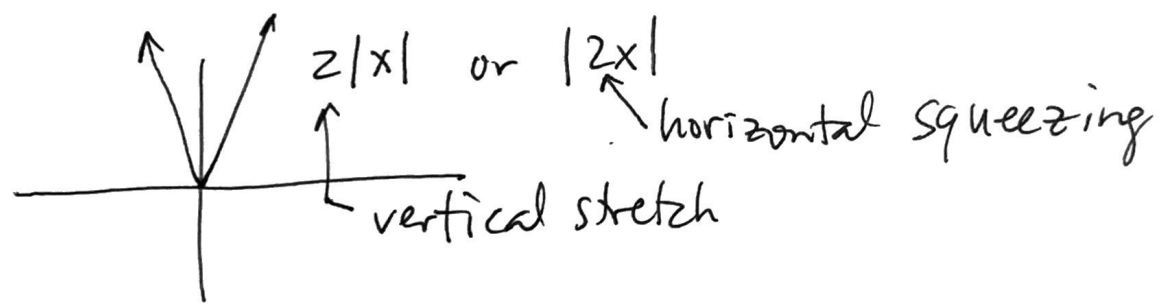
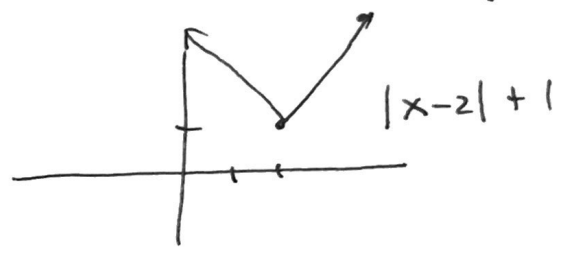
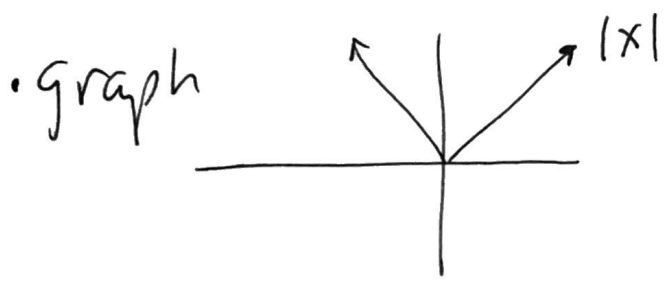
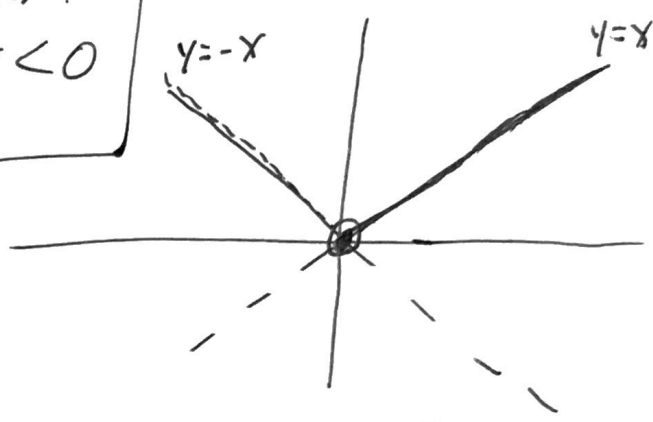


1.6 Absolute Value functions

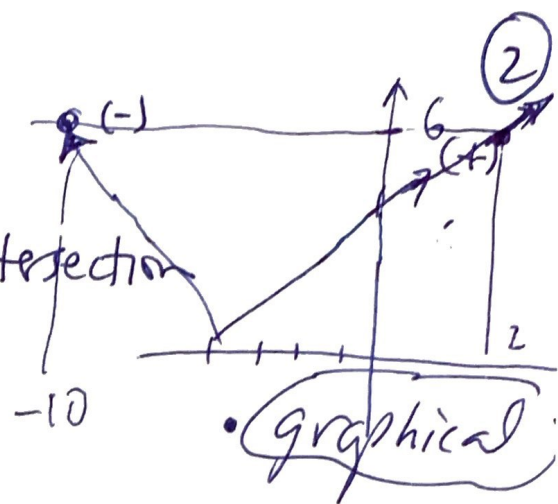
• def : $f(x) = |x|$ is really a piecewise function

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



Solving equations $|x+4| = 6$

$$\left. \begin{array}{l} f(x) = |x+4| \\ g(x) = 6 \end{array} \right\} \text{Intersection}$$



• analytically

$$|x+4| = 6$$

(-)

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

$$x+4 = -6$$

$$x = -6 - 4$$

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

(+)

$$+(x+4) = 6$$

$$x+4 = 6$$

$$x = 6 - 4$$

$$\boxed{x = 2}$$

$$|x+4| = \begin{cases} x+4 \\ -(x+4) \end{cases}$$

Trick: Solve $|x+4| = -8$

$$\begin{array}{l} -(x+4) = 8 \\ x = -12 \end{array}$$

$$\begin{array}{l} +(x+4) = 8 \\ x = 4 \end{array}$$

absolute value > 0

X

* Solving Inequalities

$$|x+4| \leq 6$$

(-)

$$-(x+4) \leq 6$$

$$x+4 \geq -6$$

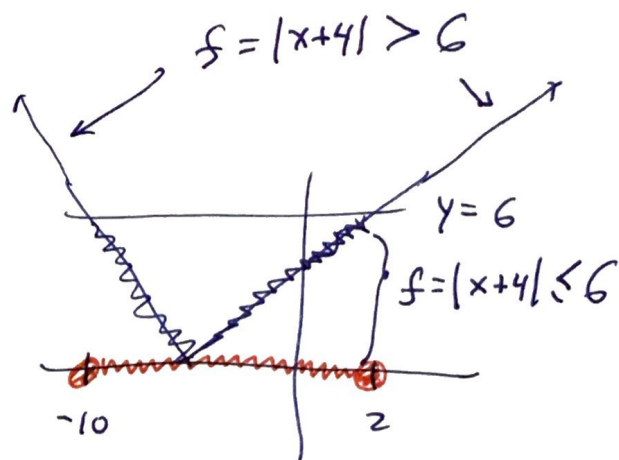
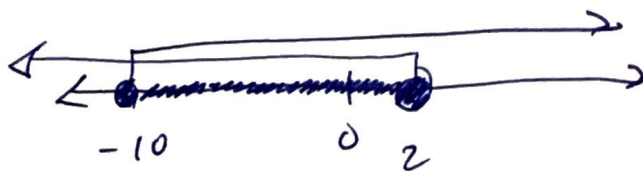
$$x \geq -10$$

(+)

$$+(x+4) \leq 6$$

$$x \leq 6 - 4$$

$$\text{and } x \leq 2$$



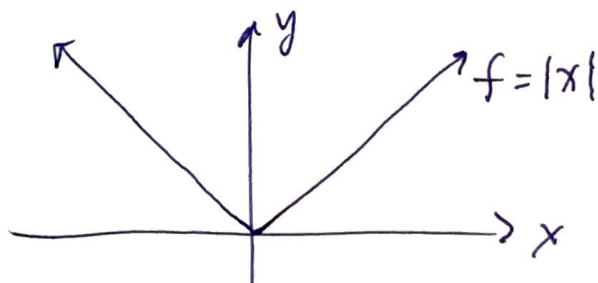
Not done with 1.6

1.6 (Cont.) Absolute V

Review $f(x) = |x|$

$$f = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases}$$

graph



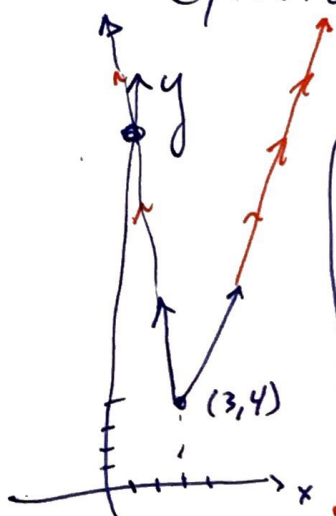
to plot replace "f" with y

equations: Find the x & y intercepts of

$$f(x) = 4|x-3| + 4$$

compare to $f = a|x-h| + k$, vertex @ $(x,y) = (h,k)$

vertex @ $(x,y) = (3,4)$



y-int: $f(0) = 4|0-3| + 4 = 12 + 4 = 16$ $(0,16)$

x-int: $f(x) = 0$ {zero's of $f(x)$, aka. "roots"}

$$\begin{aligned} 0 &= 4|x-3| + 4 \\ \div 4 &\hookrightarrow 0 = |x-3| + 1 \end{aligned}$$

"flipping" isolate: $|x-3| = -1$ + trick question "special cases"

$$\begin{aligned} (-) &\quad -(x-3) = -1 & (+) &\quad +(x-3) = -1 \\ &\quad \boxed{x=4} & &\quad \boxed{x=2} \end{aligned}$$

No Zeros

1.6 (Cont.)

EX



* inequalities: Solve $|3x-5| \geq 13$ "two half-line"

$$\begin{array}{lcl} (-) & - & (+) \\ -(3x-5) \geq 13 & & +(3x-5) \geq 13 \\ 3x-5 \leq -13 & & 3x-5 \geq 13 \\ 3x \leq -8 & & 3x \geq 18 \end{array}$$

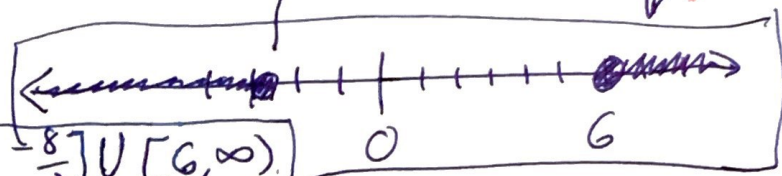
$$x \leq -\frac{8}{3} \text{ or } x \geq 6$$

• Algebraic soln

• graphical solution

• interval solution

$$(-\infty, -\frac{8}{3}] \cup [6, \infty)$$



EX

Solve

$$2|v-7| - 4 \geq 42$$

(i) isolate |...| : $|v-7| - 2 \geq 21$

$$|v-7| \geq 23$$

$$\begin{array}{lcl} (-) & & (+) \\ -(v-7) \geq 23 & & +(v-7) \geq 23 \\ v-7 \leq -23 & & v-7 \geq 23 \end{array}$$

$$v \leq -16 \text{ or } v \geq 30 \text{ 2-half lines}$$

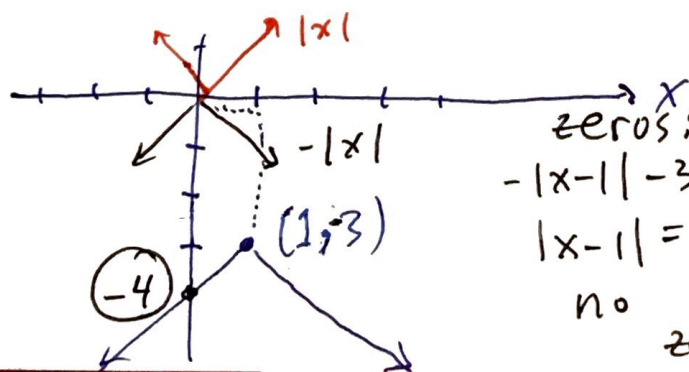
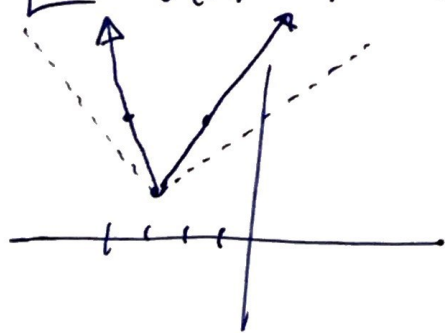
* graphing via transformations

EX

$$f(x) = 2|x+3| + 1$$

EX

$$\text{graph } f(x) = -|x-1| - 3$$



zeros:
 $-|x-1| - 3 = 0$
 $|x-1| = -3$
 no real zero