

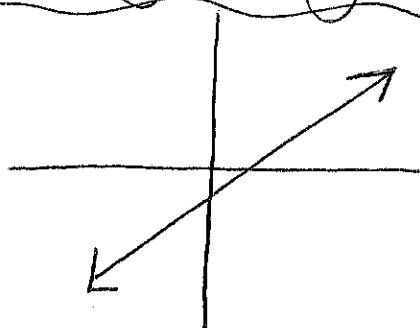
# Domain & Range - A review

Domain = x values

Range = y values

$-3 > x \geq 5$   
 ↑ x is less than -3    ← read from x out    ↓ x greater & equal to 5

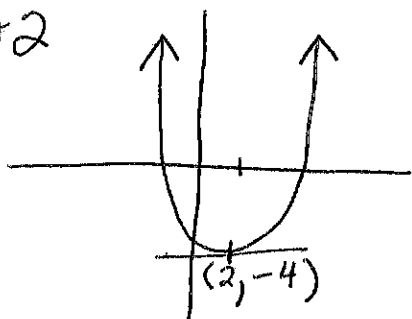
ex #1



Domain:  $x \in \text{all real}$   
or  $x \in \mathbb{R}$

Range:  $y \in \mathbb{R}$

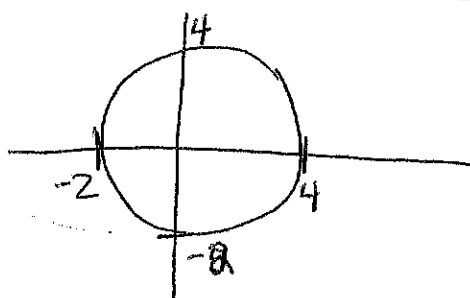
ex #2



Domain:  $x \in \mathbb{R}$  (because lines keep going)

Range:  $y \geq -4$ ;  $y \in \mathbb{R}$   
because y is not below -4

ex #3

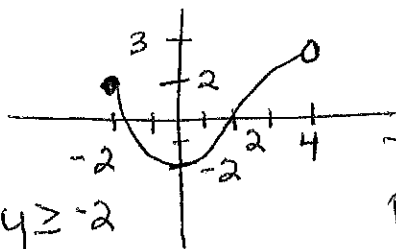


This has specific limits

$x \geq -2$  and  $x \leq 4$   
 $y \geq -2$  and  $y \leq 4$

Domain:  $-2 \leq x \leq 4$ ;  $x \in \mathbb{R}$   
Range:  $-2 \leq y \leq 4$ ;  $y \in \mathbb{R}$

ex #4



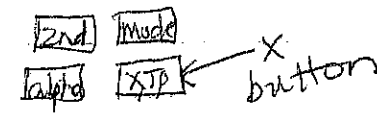
\*  $y \neq 3$   
 $y < 3$      $y \geq -2$

\*  $x \neq 4$  but  $x < 4$

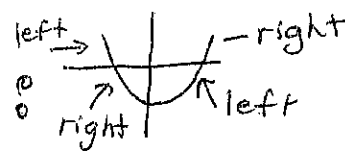
$x = -2$  and  $x > -2$

Domain  $\Rightarrow -2 \leq x < 4$ ;  $x \in \mathbb{R}$   
Range  $\Rightarrow -2 \leq y < 3$

# Graphing calculator Assignment

Graph  $x^2 + 4x - 12$  

- ① press  $y=$  button + put in above equation
- ② press graph.

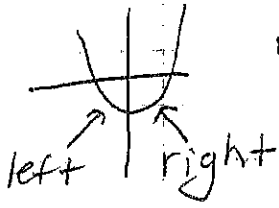
Find the following: 

- ③ x intercepts → a) 2nd F Trace  
b) 2: zero; enter  
"Left bound" - put on the left side of use arrows ( $<$   $>$ ) the x intercept; enter  
"right bound" put on the right side of the x intercept; enter  
"Guess" → enter  
\* at the bottom is the x intercept coordinates.  
\* do it again for the other x intercept.

- ④ y intercept → a) 2nd F Trace  
b) 1: value; enter  
 $x = 0$ ; enter  
\* at the bottom, is the coordinates for the y intercept.

- ⑤ vertex - decide if it is a max or min.  
a) adjust WINDOW →  $y_{\min} = \underline{\underline{-20}}$

graph \* check to see if you can see vertex



b) 2nd Trace ; enter

c) 3 minimum ; enter

d) (< >) to put on left side of vertex ; enter

e) (< >) to put on right side ; enter

f) enter = vertex is at the bottom  
(\* round to nearest whole #)

6) add in another  $y =$  at  $y_2 =$   
( $\nabla$ )  $y = x + 3$  ; graph.

a) 2nd Trace ; 5: intersect ; enter

"First curve" - put close to 1st intersection on left ; enter

"Second curve" - make sure it is on the line ; enter

"Guess" - enter ; point of intersection is at the bottom.

\* do it again for 2nd point of intersection.

7) To find an equation:

a) 2nd Stat plot ;  $\square$  - enter ; ON

b) STAT -  $\square$  edit ; enter

c) put in the following points

-2	8
0	4
$-2 + \sqrt{8}$	0
$-2 - \sqrt{8}$	0

d) STAT > CALC ; <sup>on top</sup>

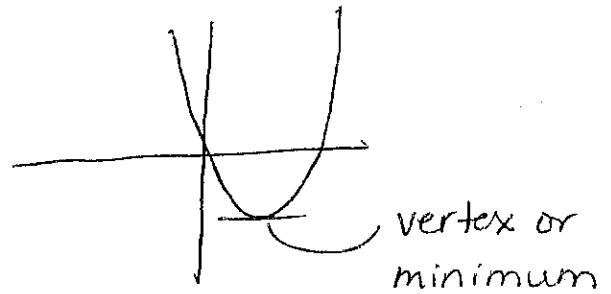
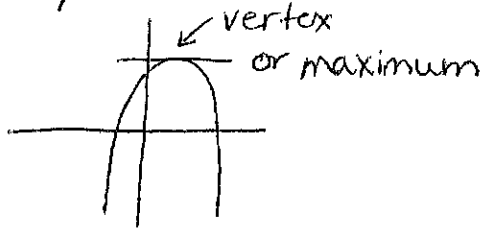
5: QUAD reg ;

enter

e) enter

a, b, c - comes up  
 $ax^2 + bx + c =$

Chapter 4 notes:



**I** To find the following by factoring:

- ① x intercepts
- ② y intercept
- ③ line of symmetry
- vertex

Factor

$$-2x^2 - 6x + 20 = 0$$

$$-2(x^2 + 3x - 10) = 0$$

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

① \* x intercepts  $x = -5$  and  $x = +2$

② \* y intercept \* make  $x = 0$

$$-2(0)^2 - 6(0) + 20 = 20$$

so y intercept is  $(0, 20)$

line of symmetry (\* is  $\frac{1}{2}$  way between 2 x intercepts)

③ \* add 2 x intercepts and  $\div$  by 2

x intercepts are  $-5 + 2$

so  $\frac{-5+2}{2} = -\frac{3}{2}$  line of symmetry is  $x = -\frac{3}{2}$

PC 11

MT review 4-2

④\* Use the line of symmetry to find the vertex (vertex is on the line of symmetry)

line of symmetry  $\Rightarrow x = -\frac{3}{2}$  or  $x = -1.5$  \* plug in to equation to find y value.

\*remember

$$-2x^2 - 6x + 20 = 0$$

is the same as  $-2x^2 - 6x + 20 = y$

$$-2\left(-\frac{3}{2}\right)^2 - 6\left(-\frac{3}{2}\right) + 20 = y$$

$$-2\left(\frac{9}{4}\right) + 9 + 20 = y$$

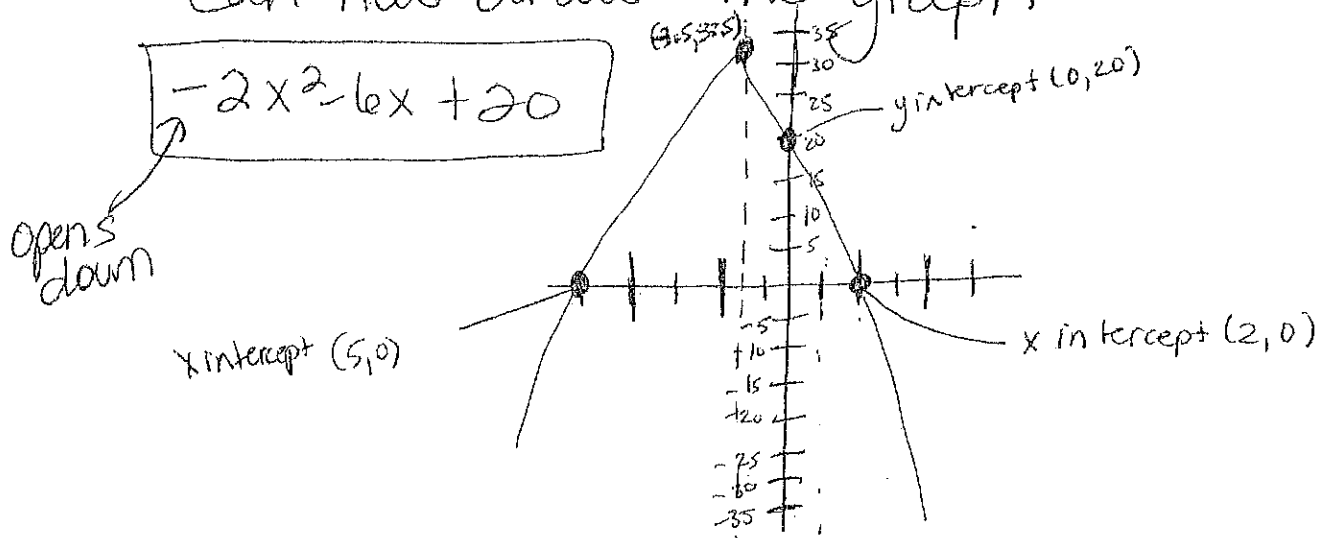
$$+\frac{18}{4} + 9 + 20 = y$$

$$+4.5 + 9 + 20 = y \Rightarrow y = +33.5$$

So... vertex  $(-1.5, 33.5)$

$\Rightarrow$  using the above information you (previous)

can now draw the graph



(II) Completing the square to draw the equation

$$x^2 - 10x + 3 = 0$$

$$\left(x^2 - \left(\frac{10}{2}\right)^2 + \left(\frac{10}{2}\right)^2\right) + 3 = 0$$

$$(x - 5)^2 - 5^2 + 3 = 0$$

$$(x - 5)^2 - 22$$

Vertex (5, -22)

\* Vertex

\* line of symmetry

line of symmetry  
x = 5

y intercept = make x = 0

$$(x - 5)^2 - 22$$

$$(0 - 5)^2 - 22$$

$$25 - 22$$

$$= 3$$

(0, 3) ⇒ y intercept

x intercepts:

$$(x - 5)^2 - 22 = 0 \quad \xrightarrow{+22}$$

get ( )<sup>2</sup> by itself.

$$(x - 5)^2 = 22$$

√ both sides

$$\sqrt{(x - 5)^2} = \sqrt{22}$$

$$x - 5 = \pm \sqrt{22}$$

$$+5 \quad +5$$

$$x = 5 \pm \sqrt{22}$$

$$\nearrow 5 + \sqrt{22}$$

$$\searrow 5 - \sqrt{22}$$

x intercepts.

**4.3** Transformations:

$$y = a(x-p)^2 + q$$

$\leftarrow$  + moves up  
 $\leftarrow$  - moves down  
 $\uparrow$  - moves right  
 $\uparrow$  + moves left  
 + up (v)  
 - down (n)  
 2 compress by a factor of 2  
 $\frac{1}{2}$  expand by a factor of 2

**4.4** Determining the equation:

Depending on information given use the following:

(I) given x intercepts:

$$y = a(x+p)(x-q)$$

(II) given vertex

$$y = a(x-p)^2 + q$$

(ex) if given x intercepts  $-5, +2$  &  $(0, 20)$

$$y = a(x+5)(x-2)$$

\* plugin another point for x & y values

$$20 = a(0+5)(0-2)$$

$$20 = \frac{-10a}{-10}$$

$$a = -2$$

equation  $\Rightarrow y = -2(x+5)(x-2)$  or expanded  $-2x^2 - 6x + 20 = a$

PC 11

MT.  
review CH 4-5

ex. 2 if given vertex & other point.

$$V(3, 1)$$

$$(1, 3)$$

$$y = a(x-3)^2 + 1$$

\* plug in other point for x & y

$$3 = a(1-3)^2 + 1$$

$$3 = a(-2)^2 + 1$$

$$\begin{matrix} -1 & & -1 \\ 2 & = & 4a \end{matrix}$$

$$\frac{2}{4} = \frac{4a}{4}$$

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

$$\text{equation} \Rightarrow y = \frac{1}{2}(x-3)^2 + 1$$