Algebra 2

Ch. 5 Handout 5.1

Modeling Data with Quadratic Functions

Standard Form of a Linear Function

$$f(x) = mx + c$$

linear term

constant

Standard Form of a Quadratic Function

$$f(x) = ax^2 + bx + c \quad a \neq 0$$

quadratic term **linear term** **constant**

The condition $a \neq 0$ gives every quadratic function a quadratic term, but not necessarily a linear term or a constant term. If a = 0, then the function no quadratic term, and it is not a quadratic function.

1. Determine whether each function is linear or quadratic. Identify the quadratic, linear, and constant terms.

a. $f(x) = (2x-1)^2$

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

F O I L

$4x^2 - 2x - 2x + 1$

$f(x) = 4x^2 - 4x + 1$

Quadratic

Q: $4x^2$

L: $-4x$

C: 1

b. $f(x) = x^2 - (x+1)(x-1)$

F O I L

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

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

$= x^2 - x^2 + 1$

$f(x) = 1$

Linear

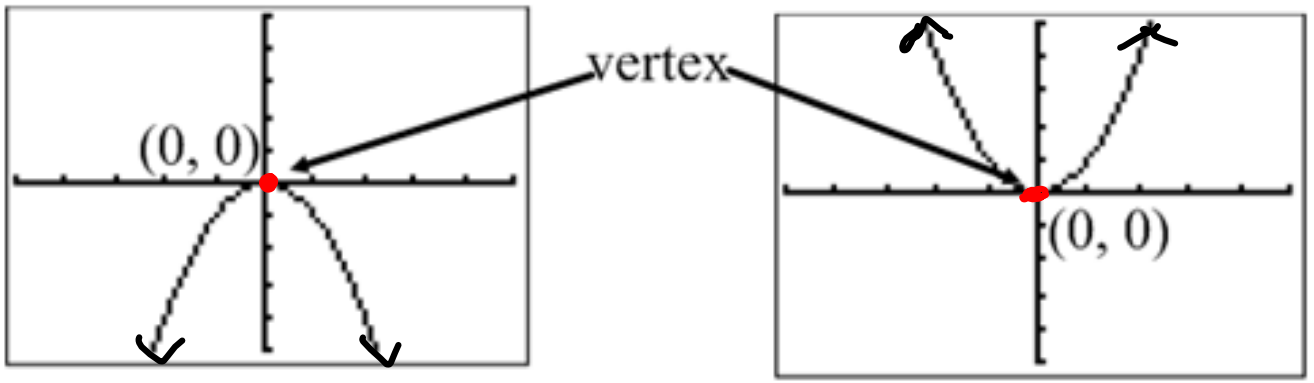
Q: none

L: none

C: 1

Parabola -- the graph of a quadratic equation

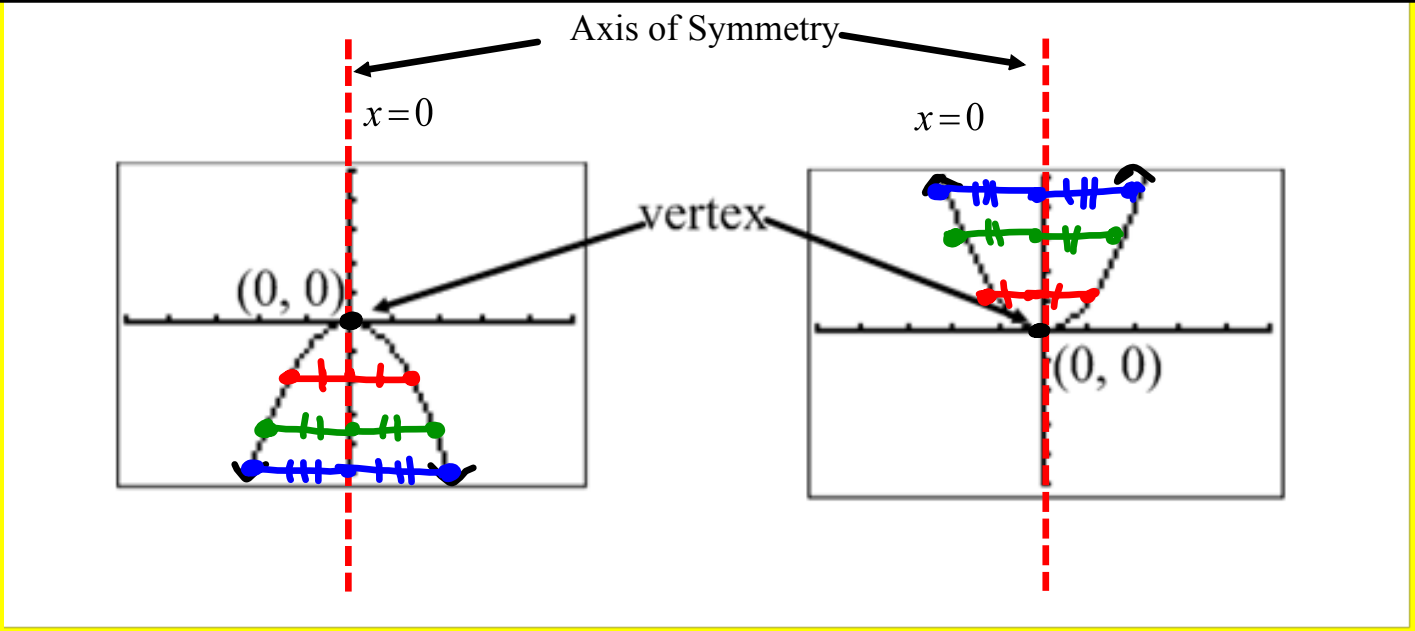
"mirror images"



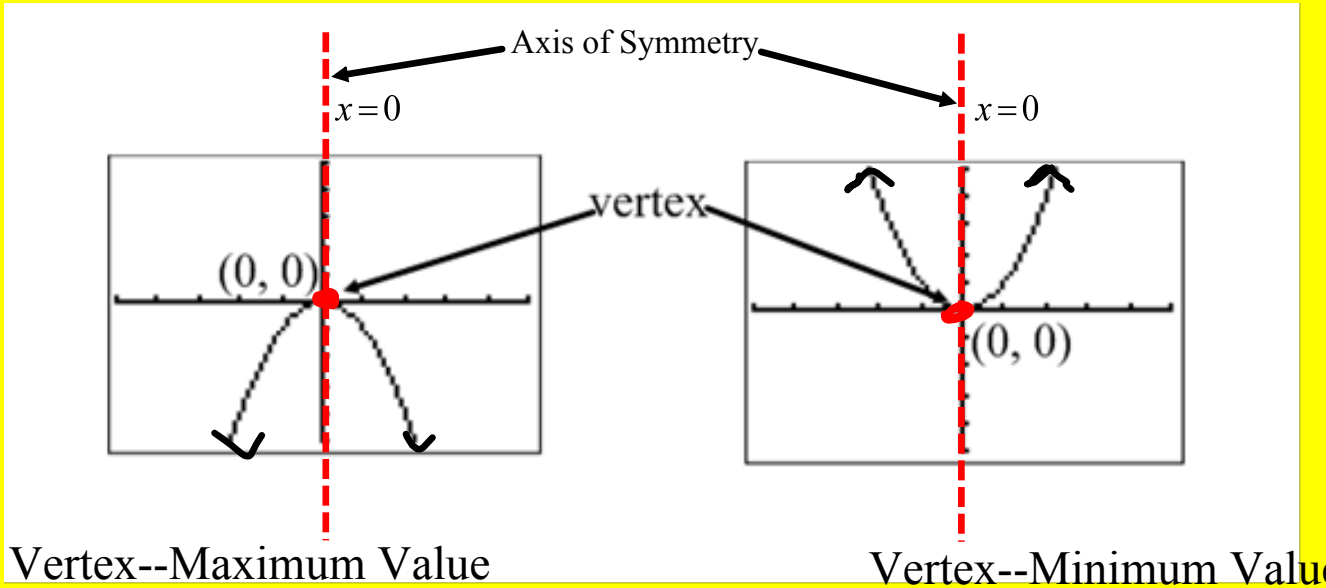
Vertex--Maximum Value
Vertex is the highest point on parabola

Vertex--Minimum Value
Vertex is the lowest point on parabola

Axis of Symmetry -- line that divides a parabola into 2 parts that are mirror images



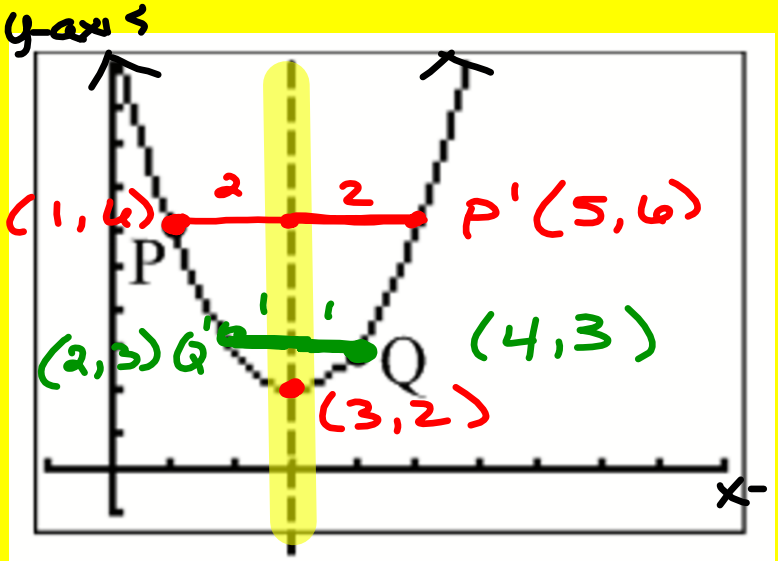
Vertex -- point at which the parabola intersects the axis of symmetry



Vertex--Maximum Value
Vertex is the highest point on parabola

Vertex--Minimum Value
Vertex is the lowest point on parabola

2. Below is the graph of $y = x^2 - 6x + 11$. Identify the vertex, axis of symmetry, poi
P` and Q` corresponding to P and Q, and the range of f(x).



V: (3,2)

AOS: x = 3

P': (5,6)

Q': (2,3)

R: $[2, \infty)$

3. Find a quadratic function that includes the values in the ta

x	-2	1	5
y	-17	10	-10

$ax^2+bx+c=y$

$(-2,-17)$ $a(-2)^2+b(-2)+c=-17$ $\quad 4a-2b+c=-17$

$(1,10)$ $a(1)^2+b(1)+c=10$ $\quad a+b+c=10$

$(5,-10)$ $a(5)^2+b(5)+c=-10$ $\quad 25a+5b+c=-10$

$$\begin{array}{r} 4a-2b+c=-17 \\ +\;-a+b+c=-10 \\ \hline \frac{3a}{3}-\frac{3b}{3}=\frac{-27}{3} \end{array} \qquad + \begin{array}{r} 25a+5b+c=-10 \\ -a+b+c=10 \\ \hline \frac{24a}{4}+\frac{4b}{4}=\frac{-20}{4} \end{array}$$

$a-b=-9$

$6a+b=-5$

$7a=-14$

$a=-2$

$a-b=-9$

$-2-b=-9$

$-b=-7$

$b=7$

$a+b+c=10$

$-2+7+c=10$

$5+c=10$

$c=5$

$f(x)=ax^2+bx+c$

$f(x)=-2x^2+7x+5$

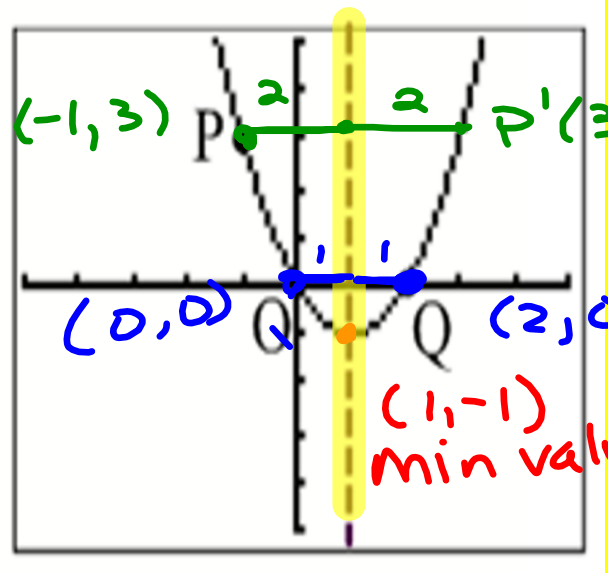
Check

$(-2,-17)$ $-2(-2)^2+7(-2)+5=-17$

$(1,10)$ $-2(1)^2+7(1)+5=10$

$(5,-10)$ $-2(5)^2+7(5)+5=-10$

5. Identify the vertex and the axis of symmetry of each parabola. Identify point corresponding to P` and Q`. Determine the range of f(x).



V: (1,-1)

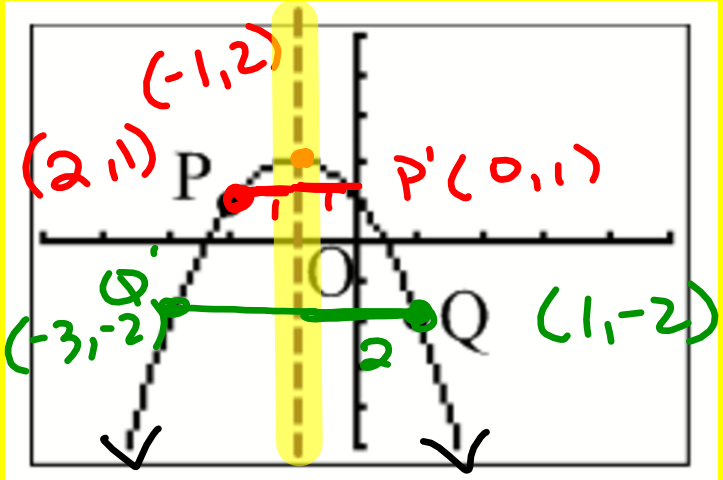
Aos: x=1

P': (3,3)

Q': (0,0)

R: $[-1,\infty)$

5. Identify the vertex and the axis of symmetry of each parabola. Identify point corresponding to P` and Q`. Determine the range of f(x).



V: (-1, 2)

Aos: $x = -1$

P': (0, 1)

Q': (-3, -2)

R: $(-\infty, 2]$

Assignment:

Pgs 241-243 1-16, 27-29, 32, 34