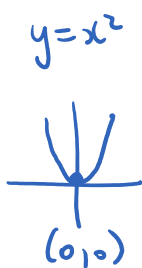


QUIZ

- a) $y = f(x+3)$ **Left Shift**
- b) $y = f(x)+3$ **Shift Up**
- c) $y = f(-x)$ **Reflection in y-axis
Horizontal Reflection**
- d) $y = 3f(x)$ **Vertical Stretch**
- e) $y = f(3x)$ **Horizontal Compression**



Quiz Tues 12th 4.3

Omit Section 4.4 #3

4.3 Quadratic Functions Cont'd

RECAP

Parabola

$$y = ax^2 + bx + c$$

Vertex

$$x = \frac{-b}{2a}$$

$$y = a(x-h)^2 + k$$

$$(x,y) = (h, k)$$

$$y = a(x+h)^2 + k$$

$$(x,y) = (-h, k)$$

Why is the vertex of $y = ax^2 + bx + c$ at $x = -\frac{b}{2a}$?

$$y = ax^2 + bx + c$$

Complete the Square

$$y = a \left(x^2 + \frac{b}{a}x \right) + c$$

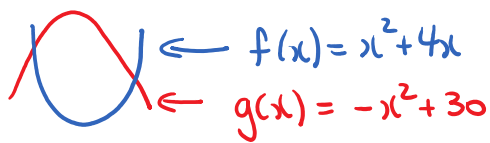
Divide $\frac{b}{a}$ by 2:

$$\frac{b}{2a}$$

$$y = a \left(x + \frac{b}{2a} \right)^2 + \#$$

$$\text{Vertex: } x = -\frac{b}{2a}$$

Ex:



a) Solve $f(x) = g(x)$ [find x]

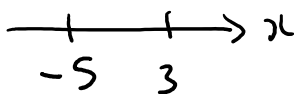
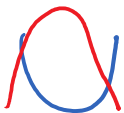
$$x^2 + 4x = -x^2 + 30$$

$$2x^2 + 4x - 30 = 0$$

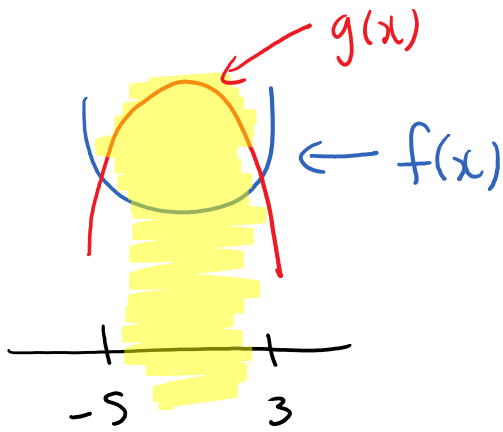
$$2(x^2 + 2x - 15) = 0$$

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

$$x = -5, 3$$



b) Solve $f(x) < g(x)$ [find x]

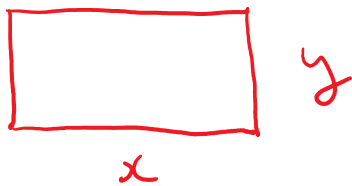


$$-5 < x < 3$$

4.4 Quadratic Models

[Real-life problems involving parabolas]

Ex: Enclose a rectangular area with 3,000m of fencing. Find the maximum area and the dimensions that achieve it.



Maximize area $A = xy$

Given: total fencing = 3,000

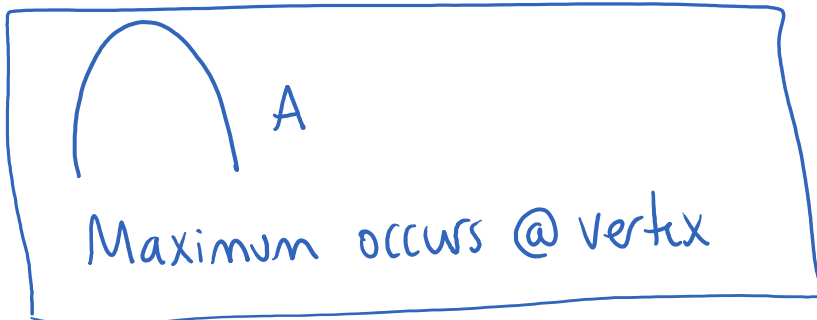
$$2x + 2y = 3,000$$

$$2y = 3,000 - 2x$$

$$2y = 3,000 - 2x$$
$$y = 1500 - x$$

Maximize $A = x(1500 - x)$

$$A = -x^2 + 1500x$$



$$x = \frac{-b}{2a} = \frac{-1500}{-2} = 750$$

$$y = 1500 - x = 1500 - 750 = 750$$

$$A = xy = 750^2 = 562,500$$

Maximum area is $562,500 \text{ m}^2$, achieved by dimensions $750\text{m} \times 750\text{m}$.