

Math 95 - Wed, 4/22

---

Math Jokes

Return tests + go over

Fill in progress sheet + calculate your grade

New material - Section 8.1

---

Midterm self-Assessment handed out: due Wed 4/29

Recovery work from checkpoint 3 to 2<sup>nd</sup> Boss  
due at second Boss.

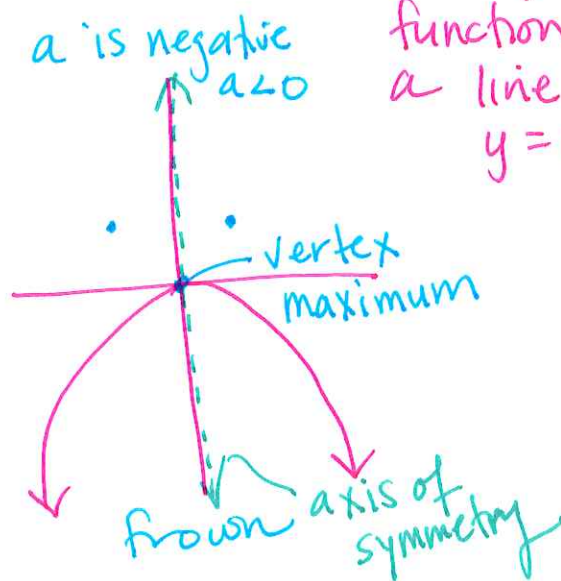
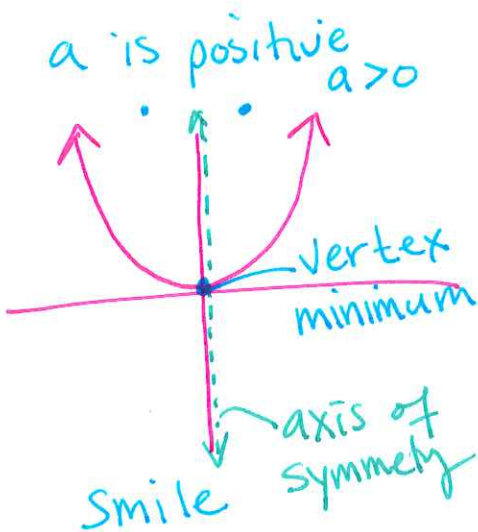
Bonus 1 due Monday

# Section 8.1 Quadratic Functions and their graphs

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

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

if  $a=0$ , the function is a line  
 $y = mx + b$



Formula to find the vertex

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

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

vertex

then plug in  $x$  to find the  $y$ -value

44.  $f(x) = x^2 - 2x + 2$

a. vertex and axis of symmetry

$$a = 1 \quad b = -2 \quad c = 2$$

$$x = \frac{-b}{2a} = \frac{-(-2)}{2(1)} = \frac{2}{2} = 1 \quad x = 1$$

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

vertex (1, 1)

$$y = 1$$

Vertex (1,1)

b)

X	f(x)
-1	5
0	2
1	1
2	2
3	5

vertex  
→

$$\begin{aligned} f(2) &= 2^2 - 2(2) + 2 \\ &= 4 - 4 + 2 \\ &= 2 \end{aligned}$$

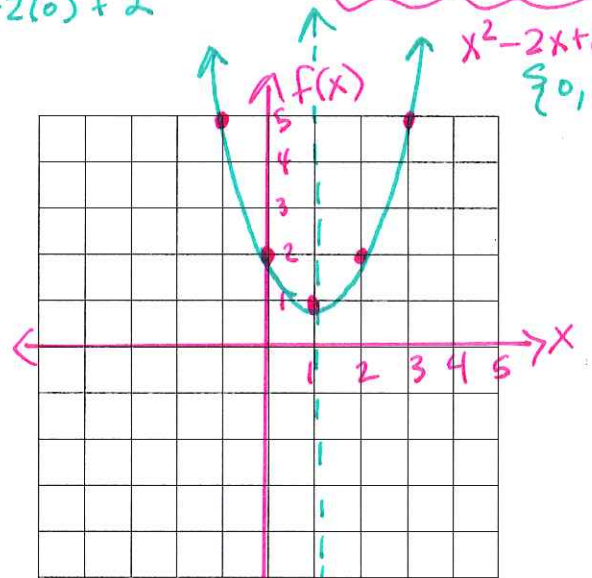
$$\begin{aligned} f(3) &= 3^2 - 2(3) + 2 \\ &= 9 - 6 + 2 = 5 \end{aligned}$$

$$\begin{aligned} f(-1) &= (-1)^2 - 2(-1) + 2 \\ &= 1 + 2 + 2 \\ &= 5 \end{aligned}$$

$$f(0) = 0^2 - 2(0) + 2$$

x-intercepts  
↓  
 $x^2 - 2x + 2 = 0$   
no real solution

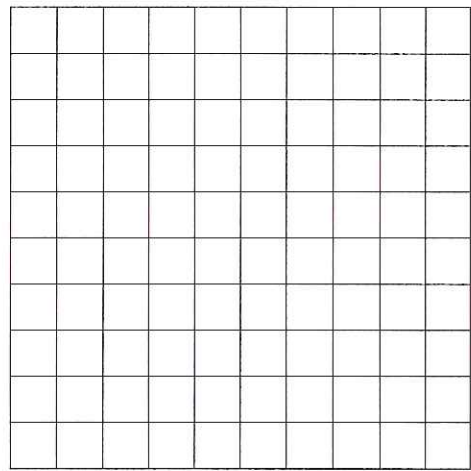
$$\begin{aligned} x^2 - 2x + 2 &= 2 \\ \{0, 2\} \end{aligned}$$



$$\begin{aligned} c) f(-2) &= (-2)^2 - 2(-2) + 2 \\ &= 4 + 4 + 2 \\ &= 10 \end{aligned}$$

axis of symmetry  
 $x=1$

$$f(3) = 5$$



# 89 + 90

89. Earth

$$h(t) = -16t^2 + 66t + 6$$

constant of gravity

initial velocity feet per sec.

initial height y-intercept

90. Moon

$$h(t) = -2.55t^2 + 66t + 6$$

viewing window

$$\begin{aligned} x_{\min} &= -1 \\ x_{\max} &= 30 \\ x_{\text{scl}} &= 1 \\ y_{\min} &= -10 \\ y_{\max} &= 500 \\ y_{\text{scl}} &= 50 \end{aligned}$$

ex: 100.

Graph f in

$$[20, 40, 5] \quad \text{by} \quad [0, 30, 5]$$

$x_{\min}$   $x_{\max}$   $x_{\text{scl}}$        $y_{\min}$   $y_{\max}$   $y_{\text{scl}}$

89. After how many seconds does the baseball reach a maximum height?

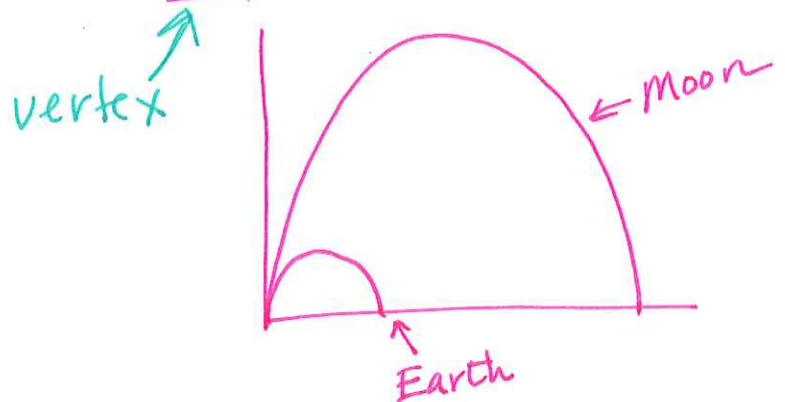
$$h(t) = -16t^2 + 66t + 6$$

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

$$= \frac{-66}{2(-16)} = \frac{-66}{-32}$$

$$= 2.0625$$

≈ 2 seconds



After 2 seconds the ball reaches maximum height

$$\begin{aligned} h(2) &= -16(2)^2 + 66(2) + 6 \\ &= -16 \cdot 4 + 132 + 6 \\ &= -64 + 132 + 6 \\ &= 74 \end{aligned}$$

The maximum height is 74 feet.

FS math

4: Maximum

Lower bound

Left of the max

Upper bound

Right of the max

90. moon

$$h(t) = -2.55t^2 + 66t + 6$$

maximum

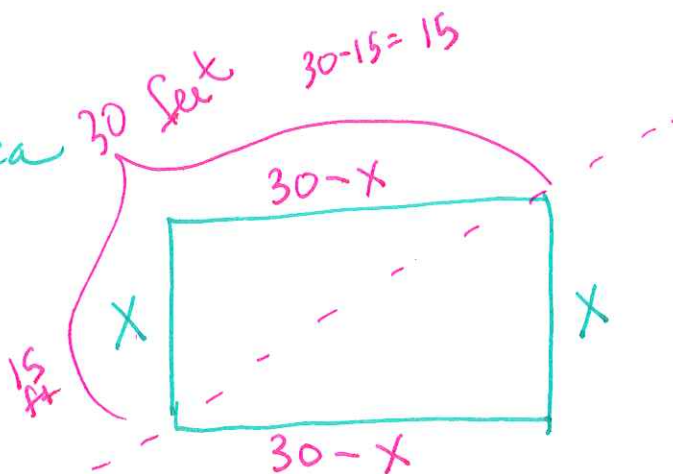
$$(12.9412, 433.059)$$

At  $\approx 13$  seconds, the ball reached its maximum height of 433 feet.

$$\begin{matrix} (2.0625, 74.0625) \\ x_c & y_c \end{matrix}$$

96. Maximizing Area

60 feet  
of fence



a)

$$\begin{aligned} A &= l \cdot w \\ &= x(30 - x) \end{aligned}$$

$$f(x) = x(30 - x)$$

find the vertex

$$(15, \underline{225})$$

Dimensions of  
the pen:  $15 \times 15$  ft pen

What is the  
largest area? 225 sq. ft.

$$\begin{aligned} 2x + 2y &= 60 \\ -2x & \quad -2x \\ \hline 2y &= 60 - 2x \\ \frac{2y}{2} &= \frac{60 - 2x}{2} \\ y &= 30 - x \end{aligned}$$

