Assignment #13

P567 #24

x	y		
0	200		
		-7	
1	193		-4
		-11	
2	182		-4
		-15	
3	167		-4
		-19	
4	148		

$c = 200$

$a + b \Rightarrow b = -5$

$2a \Rightarrow a = -2$

Because the 2nd differences are the same we have a quadratic relationship. The formula is

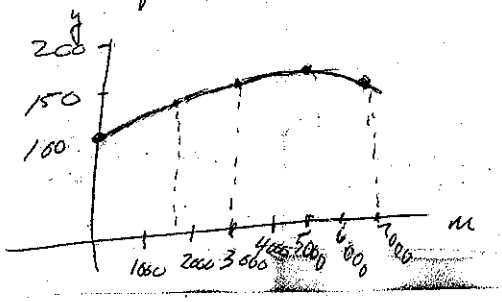
$$y = -2x^2 - 5x + 200$$

P565 #42

Let m = gallons of manure per acre

y = corn yield in bushels per acre

m	y
0	160
1750	145
3500	153
7000	153



It looks like the maximum yield would occur at $m = 5250$ halfway between $m = 3500$ and $m = 7000$. If the relationship is quadratic the equation would look like $y = a(m - 5250)^2 + k$. We choose a and k so that $(0, 100)$ and $(3500, 153)$ are points on the graph. So we have

$$\begin{cases} 160 = a(0 - 5250)^2 + k \\ 153 = a(3500 - 5250)^2 + k \end{cases} \Rightarrow \begin{array}{l} 100 = 27562500a + k \\ 153 = 3062500a + k \end{array} \text{ subtracting}$$

$$-53 = 24500000a$$

$$a \approx -2.163 \times 10^{-6}$$

$$k \approx 159.625$$

$$y \approx -2.163 \times 10^{-6}(m - 5250)^2 + 159.625$$

or

$$y = -2.163 \times 10^{-6} m^2 + .022428m + 100$$

For this approximate function the optimal use of manure would be 5184 gallons/acre.