MATH 108
Classwork  2/4/09

Section 1.2, #30 (similar to #29 from class)

Note: begin by reading the problem and assigning variables.

Given:
1) Cost of each book is $10.
2) If sale price per book is \( x \) dollars, then \( 20(x-22-x) \) copies sold will be sold. Note: in this problem, \( x \) is price per book. Let \( q = \) number sold = \( 20(x-22-x) \)

Equations:
- Total Cost = \( 9.10 \cdot q = 10 \left( \frac{20(x-22-x)}{q} \right) \)
  \( \text{(cost per book)} \cdot \text{(number sold)} \)

Revenue (total) = \# sold \cdot price per book = \( q \cdot x = \frac{20(x-22-x)}{q} \cdot x \)

Profit = Revenue - Cost = \( P(x) \)
\[ P(x) = 20(x-22-x)(x) - 10 \left( \frac{20(x-22-x)}{q} \right) \]
\[ \text{Non-simplified} \quad \text{remind E(C(y) - C(x))} \]

*Answers to problem:

\[ P(x) = 20(x-22-x)(x-10) \]
\[ \frac{\text{(quantity)} \cdot \text{(price per book)}}{\text{total profit}} \]

\[ \text{graph: vertex: } - \frac{k}{2a} = \frac{-640}{2(-20)} = \frac{-640}{40} = -16 \]
\[ \text{vertex: } \left( 16, 720 \right) \]
\[ P(16) = 720 \]

\*x-intercepts: \( P(x) = -20(x^2 - 32x + 220) \)
\[ = -20(x-22)(x-10) \]
\[ \text{let } -20(x-22)(x-10) = 0 \]
\[ x = 22 \quad \text{or} \quad x = 10 \]

\*Optimum selling price (highest profit) at \( x = 14 \) per book.