

# 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,  $20(22-x)$  copies will be sold. NOTE: in this problem,  $x$  is price per book. Let  $q = \text{number sold} = 20(22-x)$

Equations: Total Cost =  $\$10 \cdot q = 10[(20)(22-x)]$   
 (cost per book)  $\cdot$  (number sold)

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

Profit = Revenue - Cost =  $P(x)$

$P(x) = 20(22-x)(x) - 10[(20)(22-x)]$  ← Non-simplified

term of  $R(x) - C(x)$

★ Answers to problem:

OR (factored)

Function

$P(x) = 20(22-x)(x-10)$

(quantity)  $\cdot$  (profit per book)  
 (alternate way to find total profit)

• simplifies to:

$P(x) = 20x(22-x) - 200(22-x)$   
 $= 440x - 20x^2 - 4400 + 200x$

$P(x) = -20x^2 + 640x - 4400$

• parabola opening down ( $a = -20$ )

Graph: Vertex:  $-\frac{b}{2a} = \frac{-640}{2(-20)} = \frac{640}{40} = 16$

$P(16) = 720$

Vertex:  
 $(16, 720)$

• x-intercepts:  $P(x) = -20(x^2 - 32x + 220)$

$= -20(x-22)(x-10)$

Let  $-20(x-22)(x-10) = 0$

$x = 22 \quad x = 10$

★ • optimum selling price (highest profit) at  $x = \$16$  per book.

Graph ★

