

WRITE YOUR NAME:

MAC 2233 Homework 5

Due in class, Monday April 2nd

You can use more paper if necessary, but please STAPLE

**Question 1.** A store has been selling a popular computer game at the price of \$40 per unit, and at this price, players have been buying 50 units per month. The owner of the store wishes to raise the price of the game and estimates that for each \$1 increase in price, three fewer units will be sold each month. If each unit costs the store \$25, at what price should the game be sold to maximize profit?

Maximize profit. Profit = revenue - cost.

Current selling price: 40 dollars per unit

Current quantity sold per month: 50 units

If price increases by 1 dollar, quantity decreases by 3

If price increases by  $x$ , quantity decreases by  $3x$

If price is  $40 + x$  then quantity is  $50 - 3x$

$$\text{Revenue} = (40 + x)(50 - 3x)$$

NOTE: Revenue per unit =  $40 + x$

Cost per unit = 25

$$\text{Cost} = 25(50 - 3x)$$

Profit per unit =  $40 + x - 25$

=  $15 + x$

$$\text{Profit} = (15 + x)(50 - 3x) = 15 \cdot 50 - 45x + 50x - 3x^2$$

$$P(x) = 15 \cdot 50 + 5x - 3x^2 \Rightarrow P'(x) = 5 - 6x$$

Critical numbers?  $5 - 6x = 0 \Rightarrow x = \frac{5}{6} = 0.8333$

Note  $P'(x) > 0$  if  $x < \frac{5}{6}$  and  $P'(x) < 0$  if  $x > \frac{5}{6}$

So profit is maximized if  $x = \frac{5}{6} = 0.8333$

Selling price should be  $40 + x = \$40.83$

ALTHOUGH number sold must be whole number  
So some wiggle room is possible