

Math 180 - Homework #6

Write the ANSWERS ONLY on this page. Do your calculations/work elsewhere, then NEATLY transfer your answers to this page.

- The price of a watch is given by: $p = 40 - (0.01)x$. The cost of manufacturing those watches is: $C(x) = 2000 + 15x + (0.02)x^2$. How many watches should the company make to maximize its profit? What will that maximum profit be? What price should the company charge for each watch?
- A calculator company calculates the price it should charge for its calculators is: $p(x) = 60 - (0.002)x$. It further calculates the cost of manufacturing those calculators is: $C(x) = (0.003)x^2 + 30x + 25,000$. Calculate the calculator company's maximum profit, the ideal number of calculators to sell and the best price to charge for each calculator.
- A liquid form of penicillin manufactured by a pharmaceutical firm is sold in bulk at a **price of \$200 per unit**. If the total production cost (in dollars) for x units is: $C(x) = 500,000 + 80x + 0.003x^2$, and if the production capacity of the firm is at most 30,000 units in a specified time, how many units of penicillin must be manufactured and sold in that time to maximize the profit?
- A rectangular plot of land is to be fenced in using two kinds of fencing. Two opposite sides will use heavy-duty fencing selling for **\$3 a foot**, while the remaining two sides will use standard fencing selling for **\$2 a foot**. What are the dimensions of the rectangular plot of greatest area that can be fenced in at a **cost of \$6000**?
- A chemical manufacturer sells sulfuric acid in bulk at a **price of \$100 per unit**. If the daily total production cost in dollars for x units is: $C(x) = 100,000 + 50x + 0.0025x^2$, and if the daily production capacity is **at most** 7000 units, how many units of sulfuric acid must be manufactured and sold daily to maximize the profit?
- A firm determines that x units of its product can be sold daily at p dollars per unit where $x = 1000 - p$. The cost of producing x units per day is $C(x) = 3000 + 20x$. (Hint: FIRST solve $x = 1000 - p$, for p in terms of x)
 - Find the revenue function, $R(x)$.
 - Find the profit function, $P(x)$
 - Assuming that the production capacity is at most 500 units per day, determine how many units the company must produce and sell each day to maximize the profit.
 - Find the maximum profit.
 - What price per unit must be charged to obtain the maximum profit?
- Suppose that the demand equation for a monopolist is $p = 150 - .02x$ and the cost function is $C(x) = 10x + 300$. Find the value of x that maximizes the profit.
- The demand equation for a certain product is $p = 6 - \frac{1}{2}x$ dollars. Find the level of production that results in maximum revenue.

ANSWER

Watches: **417**
Profit: **\$3208.33**
Price/watch: **\$35.83**

Calculators: **3000**
Profit: **\$20,000**
Price/calculator: **\$54**

Units Penicillin: **20,000**

Dimensions of Plot:
750 by 500

Units Sulfuric Acid: **7000**
Note: $x = 10,000$ but factory can only make **7000**

(a) $R(x) = -x^2 + 1000x$

(b) $P(x) = -x^2 + 980x - 3000$

(c) # Units: **490**

(d) Profit: **\$237,100**

(e) Price/unit: **\$510**

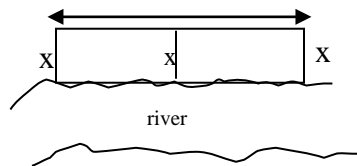
Units: **3500**

Units: **6**

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ANSWER

9. Suppose that the demand equation for a monopolist is $p = 100 - .01x$ and the cost function is $C(x) = 50x + 10,000$. Find the value of x that maximizes the profit and determine the corresponding price and total profit for this level of production.
10. The price of selling knee-wrecking snowboards is $p = -\frac{1}{3}x + 4$. Calculate the maximum revenue from selling these knee-breakers.
11. Suppose a rival snowboard company has a better way to destroy your knees and sells it for a revenue of $R(x) = 0.4x^2 + 10x + 5$ at a manufacturing cost of $C(x) = 0.5x^2 + 2x + 101$. Find the maximum profit.
12. Suppose that the revenue generated by selling x grams of crack is given by $R(x) = -\frac{1}{5}x^2 + 200x$. Assume that R is in Euros. What is the maximum revenue possible in this situation?
13. Ying Bai is the manager of a tire repair shop. She found that by charging $p = -0.25x + 40$ to fix a tire will maximize her revenue. What is this maximum revenue, how many tires need to be repaired to achieve this revenue and at what price per tire?
14. A snowmobile manufacturer is planning a new line of ski-doo's. The price is dependent on the number of ski-doo's sold (x), and is given as $p(x) = 3432 - 11x$. What is the maximum revenue that the manufacturer can expect, using this model for revenue? What will be the price for one ski-doo?
15. A farmer wants to enclose two adjacent rectangular regions, as shown below, next to a river, one for sheep and one for cattle. No fencing will be needed on the river side, but **210 m of fencing** is available. What is the area of the largest region that can be enclosed?



Units: 2500
Profit: \$52,500
Price/unit: \$75
Revenue: \$12
Profit: \$64
Revenue: €50,000
Tires: 80
Revenue: \$1600
Price/tire: \$20
Ski-Doo's: 156
Revenue: \$267,696
Price/Ski-Doo: \$1716
Total Area:
3675m²