

Note: Don't forget to do the derivative application problems that are assigned in section **4.3 and 4.4** in the book.

1) A store manager has determined that the revenue from the sale of q units is given by $R(q) = 32q - 0.4q^2$. On what interval of sales is the revenue increasing, and on what interval of sales it is decreasing?
(use $0 < q < 80$) (Ans: increasing in $0 < q < 40$, decreasing in $40 < q < 80$)

2) The revenue from the sale of q units is given by $R(q) = 40q - 0.4q^2$.
The total cost is given by $C(q) = 370 + 16q - 0.2q^2$.
On what interval is the profit increasing, and on what interval it is decreasing? (use $0 < q < 100$)
(Ans: increasing in $0 < q < 60$, decreasing in $60 < q < 100$)

3) The revenue from the sale of q units is given by $R(q) = 24q - 0.5q^2$. How many units should the company produce to maximize the revenue?
(Ans: 24 units)

4) If the revenue from the production and sale of q units, is given by: $R(q) = 140q - 0.5q^2$ and the total cost of producing q units is given by: $C(q) = q^2 + 20q + 1050$. Find the level of production and sales that will maximize the profit.
(Ans: 40 units)

5) An appliance firm determines to sell q units, the price per unit is given by $p = 150 - 0.5q$ it also determines that the total cost of producing q units is given by: $C(q) = 4000 + 0.25q^2$.

- find the total revenue function
- how many units must be produced and sell to maximize the profit
- what is the maximum profit?
- what is the price per unit must be charged to maximize the profit?

Ans: a) $R = 150q - 0.5q^2$. b) 100. c) 3500 d) 100.

6) A theater owner charges \$4 for admission when there is an average attendance of 100 people. for every \$0.20 increase in admission, there is a loss of 2 customers. What admission should be charged to maximize the revenue? what is the number of people that will maximize the revenue? (Ans: 7, 70)

7) A theater determine that if the admission price is \$ 30, it averages 400 people in attendance. But for every increase of \$ 2, it loses 20 customers from the average number. Every customers spends an average of \$ 2 on concessions. What admission price should the theater charge in order to maximize the revenue?
(Ans: \$34)

8) A company estimate that it can sell 1000 units per week if it sets the unit price at \$5, but that its weekly sales will rise by 100 units for each \$0.10 decrease in price. The company has a fixed cost each week of \$1050 and the costs in labor and materials to make a unit is \$0.10. Find the production level that maximize the profit.
(Ans: 2950 units)

9) An apartment complex has 80 units. When the rent is \$400 per month, all units are rented. For each \$10 increase in rent, one apartment unit becomes vacant. What rent should be charged to produce the maximum revenue?
(Ans: \$600)

- 10) An apple grower has 600 bushels of apples which he can sell to a single wholesaler. Today he could get \$10 per bushel, and the price is going up \$0.25 per day. On the other hand, he can count on spoilage of about 8 bushels per day. When should he sell the apples in order to maximize the revenue?

(Ans: between 17 to 18 days)

- 11) A company manufactures a machines has a fixed monthly cost of \$1000 and direct costs of \$8 for each machine produced. The company estimates that 100 machines can be sold if the unit price is \$40, and that 10 more machines will be sold for each decrease of \$2 in the price. Find the price per unit and the number of units that will maximize the profit.

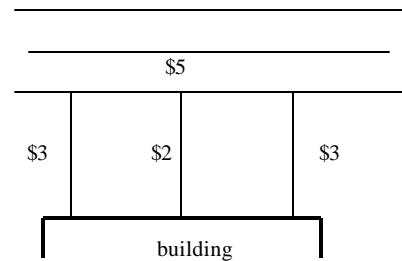
(Ans: \$34 per unit, 130 units)

- 12) A rectangular lot to be fenced off along the highway, the fence along the highway costs \$4 per ft and on the other sides \$2 per ft. Find the area of the largest lot that can be fenced off for \$600.

(Ans: 3750)

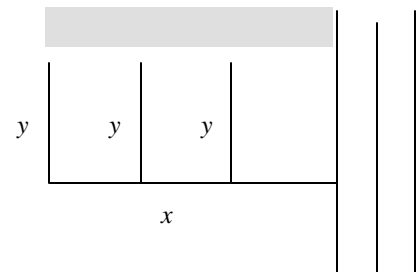
- 13) A rectangular lot to be fenced off along the highway, the fence along the highway costs \$5 per ft, on the two sides is \$3 per foot and on the middle is side is \$2 per ft. Find the dimensions for the largest area that can be fenced off for \$800.

(Ans: 80, 50)



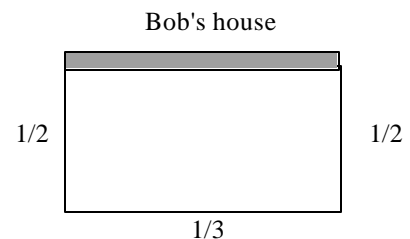
- 14) A farmer wants to enclose three rectangular areas next to a river using 300 feet of fencing. What is the largest area that can be enclosed? (Note that the farmer doesn't have to fence the sides next to the river and the road)

(Ans: 7500)



- 15) A rectangular play area to be fenced off beside Bob's house. Bob agreed to pay the cost of the side beside his house, also he agreed to pay 1/2 of the cost for two sides and 1/3 of the cost for the other side that he shares with his neighbors. if he has \$480, what are the dimensions for the largest area?

(Ans: 180, 240)



- 16) A gardener wishes to fence in a rectangular area of 1728 square feet. She also wants to insert a fence that will divide the area into two rectangular sub-areas. The drawing shows that some fencing costs \$4 per foot and some costs \$2 per foot. Find the dimensions that will minimize the cost of the garden fencing.

(Ans: 48 feet vertical by 36 feet horizontal)

