Business Calculus Final Review problems:

1) Roberts Hair Salon offers a basic haircut and a deluxe haircut. Let x represent the demand for basic haircuts and y represent the demand for deluxe haircuts. The price-demand equations are given by:
p = 12-0.3x+0.1y gives the price in dollars of a basic haircut and q = 20+0.1x-0.2y the price of a deluxe haircut.

a) Determine the Revenue function R(x,y)
b) How many of each haircut should be given to maximize revenue?
c) What is the maximum revenue?

2) The fax store expects to sell 800 fax machines in a year. Each fax machine costs $62 to store for a year, and there is a fixed cost of $24 per order. How large should each order be and how many times a year should orders be placed to minimize costs?

3) The demand for tissues is given by: $q = (100 - p)^2$ where p is the price and q is the demand for tissues.

a) Is the demand Elastic or Inelastic at a price of $30?
b) What is the best price to maximize revenue?

4) A small company manufactures bikes. The cost function is $C(x) = 10 + 5x + \dfrac{1}{60}x^3$ and the

Revenue $R(x) = 90x - x^2$, where x is the bikes produced each week and R(x) and C(x) are in dollars.

a) Find the maximum Revenue and when it occurs
b) Find the profit function P(x)
c) Where is the profit increasing?

5) Suppose the demand function for a certain product is given by: $p = \dfrac{50{,}000 - x}{25{,}000}$ where x is the

units and p the price. The cost function is $C(x) = 2100 + 0.25x$

a) Find the profit function P(x)
b) Find MP(x)
c) Find and interpret MP (15,000)

6) The monthly sales of a new computer are given by: $s(t) = 30t - 0.5t^2$ hundred units per month t months after the computer hits the market. Evaluate and Interpret s(6) and s'(6)

Answers

1) 44 basic and 72 deluxe haircuts will maximize the revenue at $984

2) 25 fax machines should be ordered 32 times a year to minimize costs

3) Inelastic at $30, best price is $33.33 to maximize revenue

4) a. 45 bikes give max revenue of $2025

b. $P(x) = \dfrac{1}{60}x^3 - x^2 + 85x - 10$

c. profit increases when you sell from 0 to 26 bikes

5) a. $P(x) = \dfrac{-x^2}{25000} + 1.75x - 2100$ b. $MP(x) = \dfrac{-x}{12500} + 1.75$

c. The profit for the 15,001st unit is $0.55

6) $s(6) = 162$, $s'(6) = 24$ 6 months after a new computer is put on the market the monthly sales are 16200 and are increasing at a rate of 2400 computers per month.