QUIZ 8 MATH 211, BUSINESS CALC, SPRING 2014 NAME:
SECTION:

The demand, D, for a new rollarball pen is given by

$$D(p) = 0.336p^3 - 2400p^2 + 72000p,\ 0 \le p \le 30$$

where p is the price in dollars. Demand represents the total number of pens the consumers want to buy at price p.

1. **How many pens will the consumers want to buy when the price is \$25 per pen?**

$$D(25) = 0.336(25)^3 - 2400(25)^2 + 72000(25) = 480,336 \text{ pens}$$

2. **Find the rate of change of quantity with repsect to price, i.e., $D'(p)$.**

$$D'(p) = 1.008p^2 - 4800p + 72000$$

3. **Find the rate of change at $p = 25$.**

$$D'(25) = 1.008(25)^2 - 4800(25) + 72000 = -47,370 \textbf{ pens/dollar}$$

4. **Using only your answers from (1) and (3), estimate the demand for pens when the price increases by \$1? Estimate the demand if the price decreases by \$1.**

   Formula: $D(p+k) \approx D(p) + k \cdot D'(p)$

Inc by \$1: $D(26) \approx D(25) + 1 \cdot (-47,370) = 432,966$ **pens**

Dec by \$1: $D(24) \approx D(25) + (-1)1 \cdot (-47,370) = 527,706$ **pens**

5. Assuming the only critical value for $D'(p)$ in the interval [0,30] is \$15, what should the price be per pen to maximize the demand. In other words, find the absolute maximum.

YOU NEED TO CHECK THE CRITICAL VALUE (15) AND THE END-POINTS 0 and 30

$$D(0) = 0.336(0)^3 - 2400(0)^2 + 72000(0) = 0 \text{ pens}$$

$$D(15) = 0.336(15)^3 - 2400(15)^2 + 72000(15) = 541,134 \text{ pens}$$

$$D(30) = 0.336(30)^3 - 2400(30)^2 + 72000(30) = 9,072 \text{ pens}$$

Maximum of 541,134 pens when the price is \$15/pen