

MATH 104 TUTORIAL
Applications of the Derivatives, Elasticity

Q1. Profit

Given the demand equation for the product is

$$p = q^2 - 100q + 3200$$

and the manufacturer's average-cost function is

$$\bar{c} = \frac{2}{3}q^2 - 40q + \frac{10000}{q}$$

- a) Find the approximated additional revenue if the capacity is increased from 20 to 21 units. What is the actual change?
- b) Find the approximated additional cost if the capacity is increased from 100 to 101 units. What is the actual change?
- c) Is it profitable to produce the 101st unit? (i.e increase from 100 to 101)
- d) What is q for maximum profit?
- e) What is the expected maximum profit?
- f) What is the selling price p at maximum profit?

Q2. Revenue

Given $q = 6 - 0.2p$. Find the approximated additional revenue. (2 to 3)

Q3. Given $p = q^2 - 100q + 3200$. Find the elasticity η at $q = 10$, $q = 20$, , $q = 30$ and comment.

Q4. Given $p = 1200 - q^2$. Find the elasticity η at $q = 10$, $q = 20$, $q = 25$ and comment.

Q5. Given $q = 900 - p^2$. Find the elasticity η at $p = 5$ and comment.

Q6. Given the demand function $q = 900 - 30p$. Determine the price at which the demand is unit elasticity.

Q7. Profit

Given the demand equation for the product is

$$q = \frac{400 - p}{50}$$

and

$$\frac{dC}{dq} = \frac{800}{q + 5}$$

- a) Find revenue maximum level of q .
- b) Is it profitable to produce the 3rd unit?
- c) Profit maximum level of q ? Corresponding price p ?
- d) Find the elasticity at $p = \$50$. Comment?
- e) Find p for unit elastic demand.