



Tutoring Sheet #8

Unit 05a : Mathematics 1

1. Find the maxima and the minima of the following functions:

a. x^2

b. $2x^4 + 4$

c. $x^3 - x$

d. $x^2 + 2x + 1$

e. $2 + 4x - x^2$

f. $2x^3 - 15x^2 + 36x + 4$

2. Find the maxima and the minima of the following functions:

a. $2x^2 + 4$

b. $5 - 3x^2$

c. $2x^3 - 9x^2 - 24x + 10$

d. $4\sqrt{x} - x$

e. $\frac{3x}{x^2 + 1}$

Sketch the graph of these functions.

3. Suppose the demand and supply functions for a market are:

$$q^d = 1200 - 2p$$

$$q^s = 4p$$

Find the equilibrium price and quantity.

4. Find all the local maxima and minima of the following functions, state whether each point is a maximum or minimum and find the value of the function at each point:

a. $y = x^2 - 4x + 2$

b. $y = x^3 - 3x^2$

c. $x + \frac{1}{x}$

c. $y = x^5$

- 5.** The average cost function of a firm is :

$$ac = 15 - 6q + q^2 + \frac{1}{q}$$

where q is the level of output .Derive the total cost and the marginal cost functions and sketch the average and marginal cost curves in the same diagram.

If the firm can sell as many units as it wishes at the price of 6 ,
What quantity will it sell if it is to maximize profits.

What profit does it make at this output? Comment.

- 6.** Find the maximum value of the following functions(show it's maximum):

a. $f(x) = (1+x)e^{\frac{-x}{2}}$ b. $f(x) = x - x \ln x$

- 7.** Find the minimum value of the following functions(show it's minimum) :

a. $f(x) = e^{\sqrt{x}} - 2\sqrt{x}$ b. $f(x) = x^2 - \ln(\sqrt{2} x)$

- 8.** A profit maximizing firm has the total cost function :

$$C = \frac{1}{3}q^3 - q^2 + 3q$$

and faces the demand schedule : $q = 30 - P$

where C and P are in £ 's.

Calculate the output of the firm which maximizes the profit.