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MAASAI MARA UNIVERSITY

**REGULAR UNIVERSITY EXAMINATIONS**

**2015/2016 ACADEMIC YEAR**

***SECOND* YEAR *SECOND* SEMESTER**

**SCHOOL OF BUSINESS & ECONOMICS**

**BACHELOR OF AGRICULTURAL ECONOMICS AND RESOURCE MANAGEMENT**

**COURSE CODE: ARE 203**

**COURSE TITLE:** **MATHEMATICS FOR ECONOMISTS I**

**DATE: 4TH MAY 2016 TIME: 8:30-10:30 AM**

**INSTRUCTIONS TO CANDIDATES**

1. Answer Question **ONE** and any other **THREE** questions

*This paper consists of* ***3*** *printed pages. Please turn over.*

**QUESTION ONE (25 MARKS)**

1. A firm faces the production function$ Q=20K^{0.4}L^{0.6}$. It can buy inputs K and L for for sh. 400 and sh. 200 per unit respectively. Using the langragian multiplier determine the combination of K and L that should be used to maximize output if its input budget is constrained at sh. 6000. **(10 marks)**
2. Given the consumers demand function as

$$ P=50-5Q$$

Determine the consumer’s surplus at p=15 **(5 marks)**

1. Use the quadratic formula to solve  **(4 marks**)
2. Suppose the demand and Average cost functions for a firm is represented by



Obtain the profit function **(6 marks)**

**QUESTION TWO (15 MARKS)**

1. Evaluate
2. $\lim\_{x\to \infty }\frac{1}{2x+7}$ **(3 marks)**
3. $Log\_{3}27+Log\_{y}y^{5}$ **(3 marks)**
4. A company extracts minerals from ores. The number of kilograms that can be extracted from each ton of ore X and Y is given as follows.

|  |  |  |
| --- | --- | --- |
|  | Ore X | Ore Y |
| Mineral A | 36 | 6 |
| Mineral B | 3 | 12 |
| Mineral C | 20 | 10 |

The cost per ton is 20 shillings and 40 shillings for ore X and Y respectively

 The company must produce at least 108, 36 and 100 kilograms of A, B and C respectively.

1. Using the above information form the linear programming problem **(3 marks)**
2. Solve the above LPP using the graphical method **(6 marks)**

**QUESTION THREE (15 MARKS)**

1. Prove that the following demand function is unitary elastic $p=\frac{1}{∝Q}$ **(5 marks)**
2. For XYZ manufacturing company, the total fixed costs are sh. 1200 and the variable costs are sh. 2 per unit. The demand equation is given as

$p=^{100}/\_{√q}$

1. At what level of output is profit maximized **(5 marks)**
2. What is the price at profit maximization **(1 marks)**
3. Analyze the continuity of  at x = 3 **(4 marks)**

**QUESTION FOUR (15 MARKS)**

1. Find the derivative of the function  **(7 marks)**
2. The population of a town of 5000 grows at a rate of 3% per year.
3. Determine the equation that gives the population at n years from now. **(2 marks)**
4. What will be the population in three years? **(1 marks)**
5. Evaluate by means of integration by substitution: 

 **(5 marks)**

**QUESTION FIVE (15 MARKS)**

1. i) Given a general quadratic equation ax2+bx+c=0 solve for x using the completion of squares method. **(5 marks)**

ii) Show how the solution in (i) above gives rise to the quadratic formula. **(5 marks)**

1. Suppose you have the following demand function

$$pq=100$$

Let c be the total cost and the marginal cost is 0.01 at q=200. Use chain rule to determine$ ^{dc}/\_{dp}$ at q=200 **(5 marks)**

 **....................END....................**