MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR
THIRD YEAR FIRST SEMESTER

SCHOOL OF BUSINESS& ECONOMICS
BACHELOR OF ARTS IN ECONOMICS

COURSE CODE: ECO 314
COURSE TITLE: QUANTITATIVE METHODS I

DATE: 23RD APRIL 2018 **TIME: 8.30A.M-10.30AM**

INSTRUCTIONS TO CANDIDATES

Answer Question ONE and any other THREE questions

This paper consists of 2 printed pages. Please turn over.

QUESTION ONE

i) Briefly, define the following terms:

a) Input-output model **[5 marks]**

b) Degenerate solution **[5 marks]**

c) Slack variable **[5 marks]**

ii) In a given County referral hospital nurses report to duty at the end of every 4 hour. Each nurse after reporting works for 8 hours continuously. The minimum number of nurses required during each period is summarized in the table below.

Interval number	**Time period**		**Minimum number of Nurses required**
	From	**To**	
1	12 midnight	4 am	20
2	4 am	8 am	25
3	8 am	12 noon	35
4	12 noon	4 pm	32
5	4 pm	8 pm	22
6	8 pm	12 midnight	15

a) Develop an objective function that would minimize the number of nurses required to report at the beginning of each period such that the total number of nurses who report would be minimized **[5 marks]**

b) What constraints if any will be included into your model **[5 marks]**

QUESTION TWO

Solve the following Linear programming problem graphically. **[15 Marks]**

Maximize $Z = 100X_1 + 50X_2$

Subject to:

$4X_1 + 6X_2 \leq 24$

$X_1 \leq 4$

$X_2 \leq 4/3$

$X_1, X_2 \geq 0$

QUESTION THREE

Suppose you are given the following information about flight schedules

	On time	delayed	Total
Sunny	167	3	170
Cloudy	115	5	120
Rainy	40	15	55
Snowy	8	12	20
Total	330	35	365

a) Compute the probability of

   i) Delayed flight **[3 Marks]**

   ii) Delayed flight given that it is snowy **[3 Marks]**

b) For these days, are the events "delayed" and "snowy" independent? Give reason for your answer. **[4 Marks]**

c) What are conditional events? **[5 Marks]**

QUESTION FOUR

a) What are the ingredients of a mathematical game? **[6 Marks]**

b) Explain any two types of games? **[4 Marks]**

c) Explain the theory of Rational Choice as used in Game theory? **[5 Marks]**

QUESTION FIVE

Suppose you are solving a maximization problem using the simplex method of linear programming. After obtaining the initial simplex table below:

	Cj	6	8	0	0		
CBi	Basic Variable	X1	X2	S1	S2	Solution	Ratio
0	S1	5	10	1	0	60	6
0	S2	4	4	0	1	40	10
	Zj	0	0	0	0		
	Cj-Zj	6	8	0	0		

Your supervisor informs you that the results in the table do not yield to an optimal solution for the maximization problem.

a) Why do you think your supervisor has arrived at this conclusion? **[2 Marks]**

b) In preparation for the first iteration, which variable is leaving and which one is entering the basis? Give reasons for your answers. **[3 Marks]**

c) Construct the table for the next iteration for this problem? Explain the key steps. **[10 Marks]**

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