UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMME:	**DEGREE IN AGRICULTURE (AEM OPTION) IV**
COURSE CODE:	**AEM 402**
TITLE OF PAPER:	**QUANTITATIVE AND RESEARCH METHODS**
TIME ALLOWED:	**TWO AND A HALF (2.5) HOURS**
INSTRUCTION:	**ANSWER ALL FOUR (4) QUESTIONS**

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SECTION A: RESEARCH METHODS

QUESTION ONE

a. The Senate of the University of Swaziland is concerned about the frequent boycotting of classes and its resulting closure of the university. You have been requested to propose a research question that would be useful to the Senate before it can introduce any policy that will help to bring an end to this.

(10 Marks)

b. Which of the three types of research design or combination of any of them would be most useful in answering the research problem you have specified in question 1a? Explain your answer.

(5 Marks)

c. In research methods' course, it was emphasized to you that the problem definition stage is probably the most important stage in the research process. How would you argue in favour of the importance of the problem definition stage?

(10 Marks)

QUESTION TWO

a. Our department of agricultural economics and management has been engaged in a planning exercise aimed at mounting a master's degree programme in agricultural economics in the near future. The department is considering of soliciting views from all stake-holders in the country. Survey research is recommended for this exercise. In your own words, explain the usefulness of this method of data collection to the exercise.

(10 Marks)

b. Telephone technology now allows researchers to hold group sessions over the telephone . What advantages and disadvantages do you think this exploratory research technique might have?

(5 Marks)

c. The presence of an interviewer generally increases the percentage of people willing to complete an interview, since the respondents are generally not required to do any reading or writing. However, this type of medium of communication with respondents has some major disadvantages. Discuss briefly these well known disadvantages.

(10 Marks)

QUESTION FOUR

A product is produced at three plants and shipped to three warehouses. The transportation costs per unit of product, warehouse demand, and plant capacity are shown in the following table.

Origin	Warehouse			Plant Capacity
	W1	W2	W3	
Plant 1	20	16	24	300
Plant 2	10	10	8	500
Plant 3	12	18	10	100
Warehouse Demand	200	400	300	900

a. Develop a linear programming model for minimizing the transportation cost.

(5 Marks)

b. Use the minimum-cost method and the stepping stone method, respectively, to find an initial solution and the optimal solution.

(15 Marks)

c. Suppose that in the above transportation problem total plant capacity were to be less than total demand of the Warehouses, will there be any need for modification in the linear programming formulation? If any, briefly describe how you will handle it.

(5 Marks)

SECTION TWO: QUANTITATIVE METHODS

QUESTION THREE

a. A firm sells its products in each of two distinct markets, A and B. In market A, the quantity demanded (Q_A) is given in terms of the price (P_A) charged in that market by:

$$(Q_A) = 2000 - 0.5\,P_A^2$$

The equivalent demand function for market B given in terms of the price (P_B) charged in that market is:

$$(Q_B) = 2500 - 0.75\,P_B^2$$

There are no fixed costs, and the variable production costs are constant and equal to E4.00 per unit. Develop the total profit-volume model for this particular firm that wishes to maximize its profit from sales in both markets.

(10 Marks)

b. Use the simplex algorithm to solve the following system of equations and inequalities. Determine the shadow prices of the inputs (requirements) of the constraints. Also, recommend one of the inputs you would select and explain why if there is limited capital to employ a unit of only one of the two inputs.

Maximize Gross Margin (GM) = $100Y_1 + 200Y_2$
Subject to:

$Y_1 + Y_2 \leq 500$ ha (Land constraint)
$2Y_1 + 6Y_2 \leq 1200$ hr (Labor constraint)
$Y_{1, Y2} \geq 0$

(15 Marks)