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

SwaziCan Company in Malkerns has contracted you to conduct a survey to determine the proportion of its customers who will continue to purchase its new brand of pineapple product after its promotional period ends. The management estimates that 30 percent of customers do so. It wants to be 95 percent confident of the results. Remember that at 95 percent confidence interval, Z is 1.96

a. What sample size is needed? **(10 Marks)**

b. What sample size would be required if the company wanted to be accurate within one percent and still be 95 percent confident of the results?

(10 Marks)

c. Explain how and why your two answers in question '1a' and '1b' differ.

(5 Marks)

QUESTION TWO

a. The problem definition stage, in every research endeavour, is probably the most important stage in the research process. How would you argue in favour of the importance of the proper problem definition?

(15 Marks)

b. What is the iceberg principle?

(5 Marks)

c. Why is knowledge of forward and backward linkages in the research process important?

(5 Marks)

SECTION TWO: QUANTITATIVE METHODS

QUESTION THREE

A product is produced at three plants and shipped to three ware houses. 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)

QUESTION FOUR

Solve the following problem using the simplex method. A processor has the ability to manufacture two products. Each product requires a blend of three ingredients. Two of the three ingredients in each product are used in both products. The available ingredients, X1, X2, X3, and X4 in pounds (lbs) amount to 6000, 4000, 350, and 800 pounds, respectively. One hundred pounds of product Y1 requires 70lbs. of ingredient X1, 25lbs. of X2, and 5lbs of X3; one hundred pounds of product Y2 requires 35lbs. of ingredient X1, 52lbs of X2 and 13lbs of X4.

a). How much of Y1 and Y2 should be made to result in maximum net returns when the net price of product Y1 is E3.20 per unit and that of product Y2 is E2.40 per unit?

(20 Marks)

b). If the processor had the opportunity to increase the value of his/her programme by bringing in one of the extra ingredients, which one would you recommend and why?

(5 Marks).