UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMME:   BSC. IN AGRICULTURAL ECONOMICS AND AGRIBUSINESS
MANAGEMENT YEAR II

COURSE CODE:   AEM 206

TITLE OF PAPER:   QUANTITATIVE METHODS FOR AGRIBUSINESS
DECISIONS

TIME ALLOWED:   2: 00 HOURS

INSTRUCTION: 1. ANSWER ANY FOUR QUESTIONS
2. EACH QUESTION CARRIES 25 MARKS

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Question 1.

Explain the following terms
 A. Linear programming
 B. The assignment problem.
 C. Sensitivity analysis

( 15 points)

1.2 A firm manufactures two products A and B, the market for each being virtually unlimited. Each product is processed on each of the machines I,II and III. The processing times in hours per item of A or B on each machine are given in the table.

|     | A    | B   | Resource's |
|-----|------|-----|------------|
| I   | 0.5  | 0.4 | 44         |
| II  | 0.25 | 0.3 | 33         |
| III | 0.5  | 0.9 | 88         |

The available production time of the machines I ,II and III is 44 hours,33 hours and 88 hours respectively each week. The profit per item of A and B is E5 and E3 respectively . The firm wishes to determine the weekly production of items of A and B which will maximize its profit. Formulate this problem as a linear programming problem only.

( 10 points)

Question 2. .
 Consider the problem
  Maximize Z $= 4x + 3y,$
 Subject to    $5x + 2y <= 40$
         $x + 2y <= 10$
 And   $x >= 0, y >= 0.$
Solve the above linear programming problem using graphical method.

A company has three plants producing a certain product that is to be shipped to four distribution centers. Plants1,2 and 3 produce 18,16 and 14 shipments per month, respectively. Each distribution center needs to receive 12 shipments per month. The distance from each plant to the respective distributing centers is given in miles:

|         | 1   | 2   | 3   | 4   |
|---------|-----|-----|-----|-----|
| Plant 1 | 700 | 800 | 300 | 600 |
| Plant 2 | 200 | 100 | 200 | 900 |
| Plant 3 | 300 | 650 | 700 | 500 |

The freight cost for each shipment is $200 plus 20 cents per mile. The company wishes to determine how much should be shipped from each plant to each of the distribution centers to minimize the total shipping costs.

A) Formulate this problem as a transformation problem by constructing the appropriate cost and requirements table.

B) Use the northwest corner rule to obtain an initial basic feasible solution.

Question 4.

Three air conditioners need to be installed in the same week by three different companies. Bids for each job are solicits from each company as shown in the table below.

|   | Bid1 | Bid2 | Bid3 |
|---|------|------|------|
| A | 53   | 96   | 37   |
| B | 47   | 87   | 41   |
| C | 60   | 92   | 36   |

To which company should each job be assigned to minimize the cost?
(Use Hungarian Algorithm for the above assignment problem)

**END OF PAPER**