

Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Science and Technology Degree Programme
3rd year 2nd Semester Examination – August / September 2014
SCT 302-2 Advanced Mathematics II

Uva Wellassa
University

Use standard symbols without definition.

Scientific calculators are allowed.

Number of questions: 04

Answer all questions

Time allocation: Two (02) hours

Mark allocation: 100 marks

1.

a. State the limitations of solving LP problems using graphical method.

(5 mark)

b. A cottage industry manufactures pedestal lamps and wooden shades, each requiring the use of a grinding/cutting machine and a sprayer. It takes 2 hours on grinding/cutting machine and 3 hours on the sprayer to manufacture a pedestal lamp, while it takes 1 hour on the grinding/cutting machine and 2 hours on the sprayer to manufacture a shade. On any day, the sprayer is available for at the most 20 hours and the grinding/cutting machine for, at the most 12 hours. The profit from the sale of a lamp and a shade are Rs. 5 and Rs. 3 respectively. Assuming that the manufacturer can sell all that he produces, how should he schedule his daily production to maximize the profit. Form an LPP and solve it graphically.

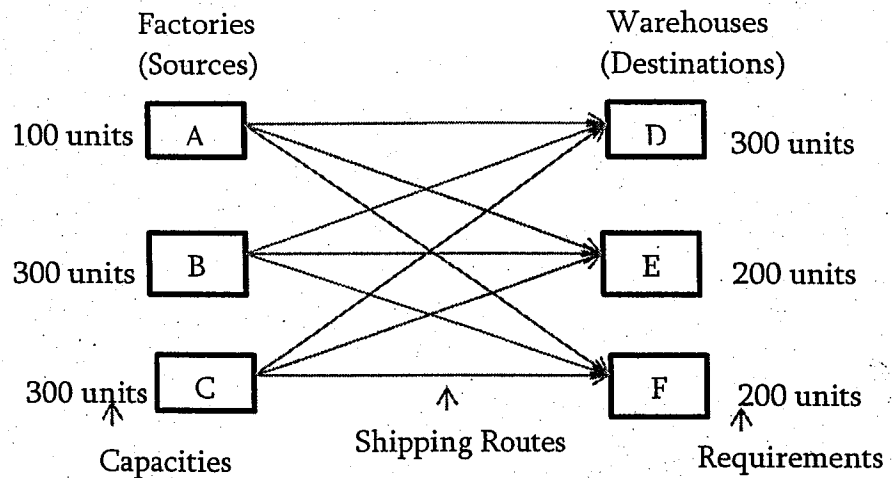
(20 mark)

2.

a. State the 3 methods that can be used to find the basic feasible solution and 2 methods to find optimal solution to a given transportation problem.

(5 mark)

b. The executive furniture corporation, which manufactures office desks at three location: A, B and C. the firm distributes the desk through regional warehouses located in D, E and F.



It is assumed that the production costs per desk are identical at each factory. The only relevant costs are those of shipping from each source to each destination. The costs are shown in below.

From \ To	D	E	F
A	5	4	3
B	8	4	3
C	9	7	5

- i. Is this a balanced problem? Why? (5 mark)
 - ii. Use northwest corner method to find a basic feasible solution to the problem (7 mark)
 - iii. Use stepping-stone method to find an optimal solution to the problem. (8 mark)
- 3.
- a. For the following matrix determine the eigenvectors corresponding to each eigenvalue and determine a basis for the eigenspace of the matrix corresponding to each eigen value.

$$A = \begin{pmatrix} 1 & 0 & 2 \\ 0 & 3 & 0 \\ 2 & 0 & 1 \end{pmatrix}$$

(15 mark)

b. Let $A = \begin{vmatrix} 0 & c & -b \\ -c & 0 & a \\ b & -a & 0 \end{vmatrix}$. Show that $A^2 + (a^2 + b^2 + c^2)A = 0$.

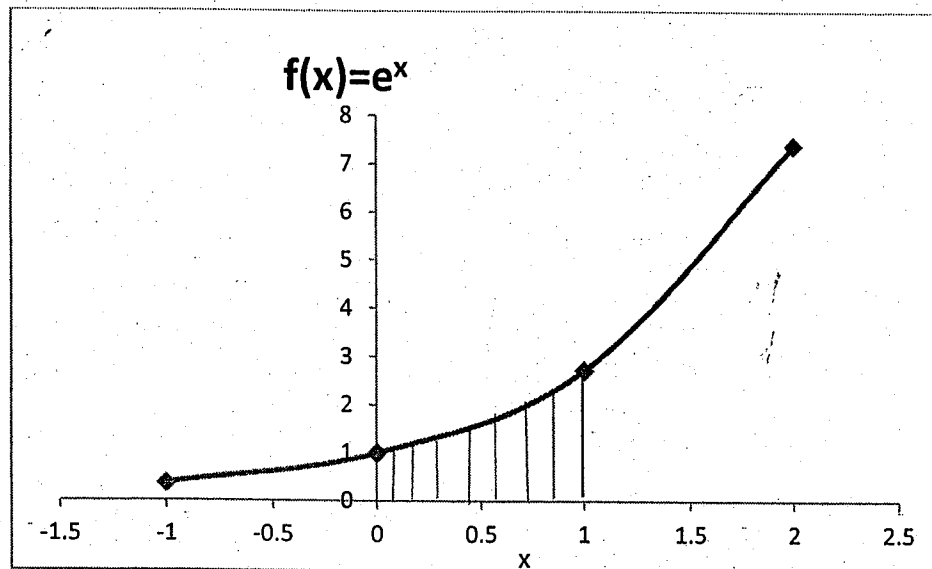
(10 mark)

4.

- a. Trapezoidal and Simpson rules are used for numerical integration. What is the major difference between Trapezoidal and Simpson rules. State the advantage of having Simpson rule rather than Trapezoidal rule.

(5 mark)

- b. Consider the following graph and find the shaded area by Simpson rule.



(20 mark)