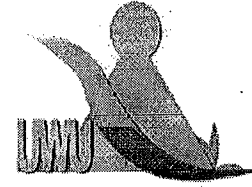


Uva Wellassa University, Sri Lanka.
End Semester Examination - June 2010
SCT 302-2 Advanced Mathematics II



Time : Two (2) hours

Answer all questions.

Calculators are allowed.

Total three (3) pages.

- 1) General simplex method, big M method and two phase simplex method are three simplex methods in Linear Programming (LP), State the advantage of each over the others.

(3 marks) ✓

- a) There are three factories (A, B and C) surrounded the BARE LAKE Colombo. Each emits two types of pollutants (1 and 2) into the lake. If the waste from each factory is processed, the pollution in the river can be reduced. It costs Rs 15 to process a kilo of factory A waste, and each kilo produced reduces the amount of pollutant 1 by 0.10 of kilos and the amount of pollutant 2 by 0.45 kilos. It costs Rs 10 to process a kilo of factory B waste, and each kilo produced reduces the amount of pollutant 1 by 0.20 of kilos and the amount of pollutant 2 by 0.25 kilos. It costs Rs 20 to process a kilo of factory C waste, and each kilo produced reduces the amount of pollutant 1 by 0.40 of kilos and the amount of pollutant 2 by 0.30 kilos. The Colombo Municipal Council wants to reduce the amount of pollutant 1 in the lake at least 30 kilos and the amount of pollutant 2 in the lake at least 40 kilos.

Formulate an LP to minimize the cost and solve it by using two phase simplex method.

(20 marks)

(P.T.O)

- 2) North-West corner method, Minimum cost method and Vogel's method can be used for the first phase of the Assignment problems. State the advantage of each over the others.

(3 marks)

- a) Sport council in UWU is putting together a relay team for the 400 meters relay. Each swimmer must swim 100 meters of breaststroke, backstroke, butterfly freestyle. Council believes that each swimmer will attain the time given in the following table. In order to minimize the team's time for the race council wants to determine which swimmer should swim in which stroke.

Swimmer	Time (seconds)			
	Freestyle	Breaststroke	Butterfly	Backstroke
Chandena	54	54	51	53
Buddhika	51	57	52	52
Prasad	50	53	54	56
Nadith	56	54	55	53

(17 marks)

- 3) Secant method is more suitable of finding roots of a equation than Bisection method and Newton's method. Explain why is that.

(3 marks)

- a) In an experiment, a researcher explains the motion of a particle in terms of a polynomial by the following equation. Find all real roots of that equation into two decimal places using Secant method.

$$f(x) = x^4 - x - 1$$

(16 marks)

(P.T.O)

- 4) Linear, Quadratic or Cubic interpolation can be used for interpolation. Among them which techniques is more efficient and explain why.

(3 marks)

- a) A ship travels through the path given by following points, use cubic interpolation to find the path of the ship by means of a polynomial.

$$\{(1, 3), (2, 1), (3, 2), (4, 3), (5, 2)\}$$

(16 marks)

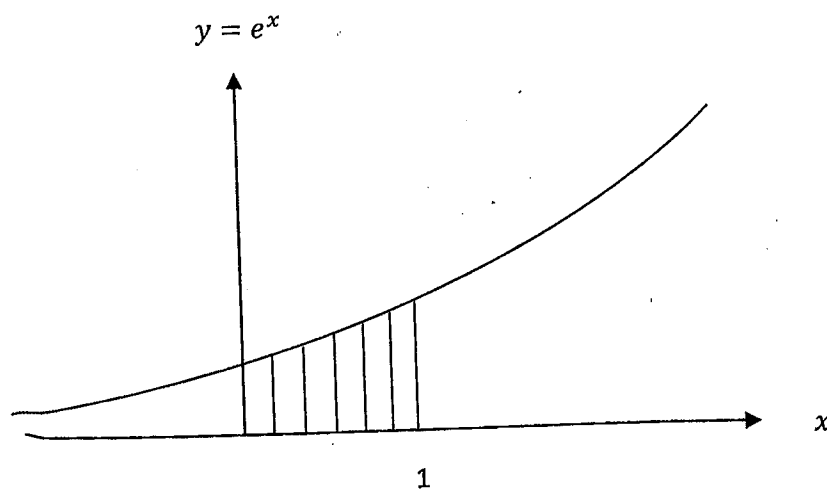
Note :- Cubic interpolation formula is :

$$\frac{x_j - x_{j-1}}{6} M_{j-1} + \frac{x_{j+1} - x_{j-1}}{3} M_j + \frac{x_{j+1} - x_j}{6} M_{j+1} = \frac{y_{j+1} - y_j}{x_{j+1} - x_j} - \frac{y_j - y_{j-1}}{x_j - x_{j-1}} \quad j = 2, 3, \dots, n-1$$

- 5) Trapezoidal and Simpson rules are used for numerical integration. Among them which technique is more efficient and explain why.

(3 marks)

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



(16 marks)