**BRAC UNIVERSITY**

**Department of Computer Science and Engineering**

**CSE330: Numerical Methods  
Final Exam, Summer 2014**

**Duration: 2.30 hours, Total Marks: 80**

**THERE ARE SEVEN (7) QUESTIONS. ANSWER ANY FOUR (4)**

1. (a) Using Gauss elimination method solve the below system: [10]

(b) Find the value of the constants *a0* and *a1* of the linear regression model y=*a0*+*a1*x considering below Table 1. [10]

**Table 1**

|  |  |  |
| --- | --- | --- |
| **Sl. No.** | **V1** | **V2** |
| 1 | 7.2 | 11.3 |
| 2 | 7.9 | 12.6 |
| 3 | 8.3 | 13.7 |
| 4 | 8.7 | 14.6 |
| 5 | 9.2 | 15.3 |
| 6 | 9.9 | 16.1 |

1. (a) Assume that you are given. Find central difference approximation of the first derivative of using step size=0.2 and 0.4. Also find the absolute relative true error for both cases. [8+2]

(b) Let *f(x) =*, numerically approximate the integral using Simpson’s 1/3 rule with *n=6.* Also find the absolute relative true error. [8+2]

1. (a) Using Runge-Khutta 4th order method to solve the ODE given below. Find the value of y at t=2 with a step size of 0.5. [10]

(b) Using the data of Table 1, find the change of V2 between V1=8.1 and V1=9.3 applying second order Newton’s Divided difference interpolation formula. [10]

1. (a) Draw a flow chart to find the root(s) of a non linear equation using bi-section method. [10]

(b) Find the root of using Newton Rapson’s method. Show your results for the first three iterations and write your answer in a tabular form.Use [10]

1. (a) Assume that you started an iterative process to find root(s) of a polynomial. How do you find the largest root and root interval for that polynomial? What are the iteration stopping criterions? Give your answer considering the below polynomial. [7]



(b) Use LU decomposition to find the inverse of below matrix: [13]

1. (a) Using Table 1. form a matrix representation for solving the coefficients for the polynomials having quadratic Splines. [10]

(b) Use false position method to find the root(s) of with *xl=0* and *xu = -0.8.* Show your results along with the percentage errors for first three iterations in a tabular form.[10]

1. (a) Derive the method for Trapezoidal rule for single segment. Also extend the formula for multiple segments? [10]

(b) With the help of Trapezoidal rule of Integration, integrate using single segment. Show, in a tabular form, the effect step size on the value of the integration considering number segments =1, 2 and 4. In the table, show the values of integration and percentage true error against the value of ‘n’. [10]

**GOOD LUCK**