**BRAC UNIVERSITY**

**Department of Computer Science and Engineering**

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

**Duration: 1 hour, Total Marks: 45**

**Section-2, Set: A**

**ANSWER ANY 3 (THREE)**

1. (a) What is true error and relative true error? [5]

(b) Mention the drawbacks of Newton-Raphsonmethod. Explain any two drawbacks with appropriate example and figures. [2+8]

1. (a) Derive the formula for finding the values of the coefficients in a linear regression model. [7]

(b) Using Table 1, find the value of V2 at V1=182 using third order Lagrangian polynomial interpolation. Also find the change of V2 between V1=163 and V1=191 using third order Lagrangian polynomial interpolation. [8]

1. (a) Using Table 1. form a matrix representation for solving the coefficients for the polynomials having quadratic splines. [8]

Table 1

|  |  |  |
| --- | --- | --- |
| **Sl. No.** | **V1** | **V2** |
| 1 | 110 | 50 |
| 2 | 165 | 65 |
| 3 | 201 | 72 |
| 4 | 234 | 89 |

(b) Draw the flow chart of false position method for finding roots of a non-linear equation. [7]

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) Find a root of the non-linear equation given below. Use bisection method and continue your solution up to 3rd iteration. Show your results in a tabular form including the percentage errors. Assume the stating value of the root as xl= 0 and xu=2. [8]

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**Section-2, Set: B**

**ANSWER ANY 3 (THREE)**

1. (a) Find the root of the non-linear equation using Newton Raphson’s Method. Continue your solution up to 3rd iteration. Show your results in a tabular form including the percentage errors. [8]

(b) Find the value of the coefficients in a linear regression model using Table1. [7]

Table 1

|  |  |  |
| --- | --- | --- |
| **Sl. No.** | **V1** | **V2** |
| 1 | 10 | 20 |
| 2 | 12 | 24 |
| 3 | 15 | 29 |
| 4 | 17 | 34 |
| 5 | 19 | 38 |

1. (a) Draw the flow chart of Bisection method for finding root of a non-linear equation. [7]

(b) Using Table 1, determine the value of V2 at V1=13 with third order polynomial interpolation using Newton’s divided difference polynomial method. Also find the change of V2 between V1=13 and V1=16. [8]

1. (a) Find a root of the non-linear equation given below. Use Secant method and continue your solution up to 3rd iteration. Show your results in a tabular form including the percentage errors. Assume the stating value of the root as -1.2 and -0.5. [8]

(b) Assume you are given *(n+1)* data points, draw the flow chart of Langrange Methodfor finding the interpolating polynomial**.** [7]

1. (a) Using Table 1, form a matrix representation for solving the coefficients for the polynomials having quadratic Splines. [8]

(b) Find a root of the non-linear equation given below. Use false position method and continue your solution up to 3rd iteration. Show your results in a tabular form including the percentage errors. Assume the stating value of the root as xl= -2 and xu=-0. [7]

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**Section-1, Set: A**

**ANSWER ANY 3 (THREE)**

1. (a) Find the root of the non-linear equation given below using Newton Raphson’s Method. Continue your solution up to 3rd iteration. Show your results in a tabular form including the percentage errors. First approximation, *x0*= -2. [7]

(b) Write down the algorithm for false position theorem. [8]

1. (a) Find the root of the non-linear equation given below using bisection method. Continue your steps up to 3rd iteration. Show your results in tabular form including percentage errors. Use *xl = -2*  and *xu=2.* [8]

(b) Assume you are given (n+1) data points, draw the flow chart of Langrange Methodfor finding the interpolating polynomial that goes through these (n+1) data points**. [7]**

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

|  |  |  |
| --- | --- | --- |
| **Sl. No.** | **V1** | **V2** |
| 1 | 10 | 29 |
| 2 | 12 | 33 |
| 3 | 15 | 37 |
| 4 | 17 | 44 |
| 5 | 19 | 47 |

(b) Write down the advantages and scopes of Numerical methods. [5]

1. (a) Suppose you are given *(x0,y0),(x1,y1),(x2,y2).....(xn,yn)* data points, derive the linear regression formula to find the value of the coefficients. [7]

(b) Using Table 1, find the value of V2 for V1(18) using third order Newton’s divided [8] difference polynomial method. Also find the change of V2 between V1=13 and V1=17.