**CSU33081 Exam Paper 2020 Answer Explanations**

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**Question 1**

Represent the summation of the following equations in MATLAB:

And

Rewrite equations in same form:

Take the coefficients in that order and enter them into vectors:

**Question 2**

Taking the MATLAB commands line by line:

**A=eye(3,3);**

A =

**For x=1:2:3**

**Iteration 1:**

x=1;

A(1,1) = 1;

A =

**Iteration 2:**

x=3;

A(1,3)=1;

A =

**Question 3**

Taking the MATLAB commands line by line:

**x=[6:8;-1:1;5 6 7];**

x =

**y=x(:,3);**

x = y =

**size(y’)**

1

y = 3 1 x 3

**Question 4**

Calculate the Truncation Error, at

Taylor Series Formula:

Using the Taylor Series Polynomial approximation of degree two, expanded about the point :

Calculating Truncation Error:

at

**Question 5**

Use the Secant Method to find a root of the function:

Accurate to within an error of where is the value of at the iteration.

Starting points:

Secant Formula:

**Iteration 1**

**Iteration 2**

**Iteration 3**

**Iteration 4**

**Iteration 5**

**Iteration 6**

Check:

Which is within

**Question 6**

Find the upper triangular matrix [U] in the [L][U] decomposition of the matrix:

Lower and Upper triangular matrices have the forms:

Where:

**Row 1**

**Row 2**

**Row 3**

The Upper triangular matrix can now be constructed:

**Question 7**

Using as an initial guess at the solution, determine the values of , and that result from three iterations of the Gauss-Seidel method applied to this matrix equation:

Creating algebraic equations from the matrix equations:

**1.**

**2.**

**3.**

**Iteration 1**

**Iteration 2**

**Iteration 3**

**Question 8**

Calculate the dominant eigenvalue and an associated eigenvector using the Power Method for the following matrix. Perform four iterations beginning with an initial estimate of:

**Iteration 1**

**Iteration 2**

**Iteration 3**

**Iteration 4**

**Question 9**

For the function :

And the points:

Calculate Newton’s second divided difference

**Question 10**

Evaluate the following integral using three-point Gaussian Quadrature:

Three point rule:

Where:

The following was calculated in radians: