

Assignment 1 CSU33081 October 2020

Please answer where asked by entering A to E as appropriate and upload this document along with your typewritten solutions (as a separate document) via Blackboard. Both documents should be in .pdf format.

Q1.

How would we represent the summation of the following two polynomials in MATLAB?

$$2x^2 + 2x - 6$$

and

$$x^3 + 2x - 4$$

Choose your answer from the following:

- A. [-6 2 2]+[-4 2 1]
- B. [2 2 -6]+[1 2 4]
- C. [2 2 2 -6]+[1 0 2 -4]
- D. [2 2 -6]+[1 2 -4]
- E. None of these

Answer:

Q2.

What is the final value of the matrix A when the following MATLAB commands are executed?

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

```
for x=1:2:3
```

```
A(1,x)=1;
```

```
End
```

Choose your answer from the following:

A. $\begin{pmatrix} 1 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 1 \end{pmatrix}$

B. $\begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$

C. $\begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{pmatrix}$

D. $\begin{pmatrix} 0 & 0 & 1 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$

E. None of these

Answer:

Q3.

What is the displayed result when the following MATLAB script file is executed?

```
x=[6:8;-1:1;567];
```

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

```
size(y')
```

Choose your answer from the following:

A. 1 1

B. 3 1

C. 1 3

D. 3 3

E. None if these

Answer:

Q4.

Calculate the Truncation Error, $f(x) - P_2(x)$ at $x = 2.5$, in approximating the function $f(x) = 3 - 17x^3$.

For the approximation use the Taylor Series polynomial approximation of degree two, $P_2(x)$, expanded about the point $x_0 = 2.0$.

Choose your answer from the following:

- A. -7.182755
- B. -7.645227
- C. -4.358405
- D. -7.994173
- E. None of these

Answer:

Q5.

Use the Secant Method to find a root of the function

$$f(x) = 16x^5 - 73x^2 - 133$$

accurate to within an error of $\epsilon = x_n - x_{n-1} = 0.001$, where x_n is the value of x at the n^{th} iteration. Use starting points $x_0 = 3$ and $x_1 = 2.5$

Choose your answer from the following:

- A. 0.982274
- B. 0.342803
- C. 1.900475
- D. 1.513896
- E. None of these

Answer:

Q6.

Use Newton-Raphson's Method to find a root of the equation:

$f(x) = x^6 - x - 1$ accurate to within an error of $\epsilon = x_n - x_{n-1} = 0.001$, where x_n is the value of x at the n^{th} iteration. Use a starting point of $x_0 = 1.5$.

Choose your answer from the following:

- A. 1.134778
- B. 0.616384
- C. 1.505056
- D. 1.160489
- E. None of these

Answer:

Q7.

Use Newton's Method to solve the following equations for x and y . Perform three iterations.

$$x^2 + xy = 10$$

$$y + 3xy^2 = 57$$

You should use an initial guess of $x = 1.5$ and $y = 3.5$. Perform three iterations.

Choose your answer from the following:

- A. $x = 3, y = 3$
- B. $x = 2, y = 3$
- C. $x = 2, y = 2$
- D. $x = 3, y = 2$
- E. None of these

Answer:

Q8.

Find the inverse of the following matrix using the Gauss-Jordan Method:

$$A = \begin{pmatrix} 0 & -3 & -2 \\ 1 & -4 & -2 \\ -3 & 4 & 1 \end{pmatrix}$$

Choose your answer form the following:

A. $\begin{pmatrix} -4 & 5 & 2 \\ 5 & -6 & 2 \\ 8 & 9 & -3 \end{pmatrix}$

B. $\begin{pmatrix} -4 & 5 & 2 \\ -5 & 6 & 2 \\ -8 & -9 & 3 \end{pmatrix}$

C. $\begin{pmatrix} -4 & -5 & 2 \\ 5 & -6 & 2 \\ -8 & 9 & 3 \end{pmatrix}$

D. $\begin{pmatrix} 4 & -5 & -2 \\ 5 & -6 & -2 \\ -8 & 9 & 3 \end{pmatrix}$

E. None of these

Answer:

Q9.

Using $x_1 = 1, x_2 = 3, x_3 = 5$ as an initial guess at the solution, determine the values of x_1, x_2 and x_3 that result from three iterations of the Gauss-Seidel method applied to this matrix equation:

$$\begin{pmatrix} 12 & 7 & 3 \\ 1 & 5 & 1 \\ 2 & 7 & -11 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 2 \\ -5 \\ 6 \end{pmatrix}$$

Choose your answer from the following:

- A. $x_1 = -2.833, x_2 = -1.4333, x_3 = -1.9727$
- B. $x_1 = 1.4959, x_2 = -0.90464, x_3 = -0.84914$
- C. $x_1 = 0.90666, x_2 = -1.0115, x_3 = -1.0243$
- D. $x_1 = 1.2148, x_2 = -0.72060, x_3 = -0.82451$
- E. None of these

Answer:

Q10.

Solve the following equation for $x = \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix}$ using LU Decomposition:

$$\begin{pmatrix} 1 & 2 & 4 \\ 3 & 8 & 14 \\ 2 & 6 & 13 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 3 \\ 13 \\ 4 \end{pmatrix}$$

Choose your answer from the following:

A. $x = \begin{pmatrix} 3 \\ 13 \\ 4 \end{pmatrix}$

B. $x = \begin{pmatrix} 3 \\ 4 \\ -2 \end{pmatrix}$

C. $x = \begin{pmatrix} 3 \\ 13 \\ -4 \end{pmatrix}$

D. $x = \begin{pmatrix} 3 \\ 4 \\ 2 \end{pmatrix}$

E. None of these

Answer:

