# 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: **E**

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: **B**

Q3.

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

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

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: **B**

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, $P_2(x)$

Choose your answer from the following:

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

Answer: **E**

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: **C**

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: **A**


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: **B**

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: **D**

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: **E**

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: **B**