CSU33081 Assignment 3

Instructions

- There are 10 Multiple Choice Questions in this assignment.
- Answer **ALL** questions by entering A, B, C, D or E on the **Answer Sheet** provided.
- Upload to Blackboard the filled out Answer Sheet with your **type written solutions as a .docx file**.
- **Submissions without fully worked solutions will receive zero marks. For Matlab questions use verbal explanations and/or pseudocode**

Q1.

Which is the correct code used to solve the system of linear equations:

$$A.(x^2) = B$$

where:

$$A = \begin{bmatrix} 1 & 4 \\ 1 & 4 \end{bmatrix}, B = \begin{bmatrix} 1 & 2 \\ 1 & 2 \end{bmatrix}$$

A. sqrt([1 4;1 4]/sqrt[1 2;1 2])
B. sqrt([1 4;1 4]/[1 2;1 2])
C. sqrt([1 4;1 4]\[1 2;1 2])
D. sqrt([1 4,1 4]\[1 2,1 2])
E. None of these

Q2.

What is the output of the following code?

```
for i=1:5
for j=1:6
a(i,j)=input();
end
end
```

A. No output
B. Error
C. Asks user to input a 5*6 matrix
D. Asks and displays a 5*6 matrix
E. None of these

Q3.

A student must plot a graph of f(x)=t and g(y)=t in the same graph, with t as a parameter. The function she uses is:

A. plot3(x,y,t)
B. plot(x,y,t)
C. disp(x,y)
D. stem(x,y)
E. None of these

Q4.

Use Newton's divided difference to write the polynomial that interpolates the discrete data below. What is, to a best approximation, the interpolated value at x=1.5?

x_i	0	1	2/3	1/3
y_i	1	0	1/2	0.866

A. 0.289
B. 1.190
C. 2.871
D. 0.787
E. None of these

Q5.

Given the data set:

t_i	1.2	1.5	1.6	2.0	2.2
y_i	0.4275	1.139	0.8736	-0.9751	-0.1536

Using cubic splines determine the value of the interpolating function at x=1.8. To a best approximation, this is:

A. 1.0264
B. -0.5286
C. 0.4382
D. 0.7876
E. None of these

Q6. The upward velocity of a body is given as a function of time as:

$t\ (s)$	11	16	22	24
$v\ (ms^{-1})$	33	45	63	28

To find the acceleration at $t = 18s$, a scientist finds a second order polynomial approximation for the velocity, and then differentiates it to find the acceleration. The estimate of the acceleration in ms^{-2} at $t = 18s$ is, to a best approximation:

A. 5.170
B. 4.830
C. 6.232
D. 8.971
E. None of these

Q7.

Develop a method to approximate $f'(x)$ using the data $f(x-h)$, $f(x)$ and $f(x+3h)$ only, where h is the interval length. What is the order of the truncation error?

A. $O(h)$
B. $O(h^2)$
C. $O(h^3)$
D. $O(h^4)$
E. None of these

Q8.

Find the order of the error term, $O(h^n)$, in the following approximation:

$$f'(x) = \frac{-f(x+2h) + 4f(x+h) - 3f(x)}{2h} + O(h^n)$$

A. $O(h)$
B. $O(h^2)$
C. $O(h^3)$
D. $O(h^4)$
E. None of these

Q9.

Let $f(x) = \sqrt{x^2 + 1}$. Compute, using Simpson's Method,

$$I = \int_{-1}^{1} f(x)dx$$

using an integration interval length $h = 0.2$. The answer is, to a best approximation:

A. 1.738
B. 2.296
C. 2.139
D. 1.874
E. None of these

Q10.

Use three-point Gaussian quadrature to approximate:

$$I = \int_{1}^{2.2} \ln x \, dx$$

The answer is, to a best approximation:

A. 0.535
B. 0.487
C. 0.023
D. 1.189
E. None of these