**CSU33081 Exam Paper 2020**

**Instructions**

* There are 10 Multiple Choice Questions. Answer **ALL** questions by entering A, B, C, D or E where asked for an answer.
* You have 24 hours to complete the paper, type up the solutions and upload all documents to Blackboard.
* If you have a registered disability then you have 28 hours to do this.
* This is a ‘Books-Open’ exam. Use of the text(s) and notes is allowed.
* Use of non-programmable calculators is allowed.
* You may not use MATLAB or similar software for this examination.
* You must upload your typeset solutions along with the filled out Multiple Choice Questionnaire and a checked declaration that this is your own work to Blackboard.
* If you have a registered disability please check the declaration to that effect.
* **ALL** documents submitted should be .pdfs
* You will only receive marks for a question if your answer is accompanied with a bona-fide solution as above.

**Please place an ‘X’ where appropriate:**

I declare that my solutions for this exam are entirely my own work: \_X\_

I am submitting after the general deadline and I have a LENS report that confirms that I am entitled to the additional time I have taken:

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**Comments: I’ve attached another file with all my workings as it’s easier to type them up in latex than in word, thank you.**

Q1.

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

and

Choose your answer from the following:

1. [-6 2 2]+[-4 2 1]
2. [2 2 -6]+[1 2 4]
3. [0 2 2 -6]+[1 0 2 -4]
4. [2 2 -6]+[1 2 -4]
5. None of these

Answer: C

It’s a third-degree equation so a 0 gets put in where there’s no value

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:

1. None of these

Answer: B – AN identity matrix is made using eye(), then replaces any 0 it lands on in the for loop with a start of 1, step of 2 and end of 3. Doesn’t index into other rows.=, so only first row is affected.

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:

1. 1 1
2. 3 1
3. 1 3
4. 3 3
5. None of these

Answer: C. Array

|  |  |  |
| --- | --- | --- |
| 6 | 7 | 8 |
| -1 | 0 | 1 |
| 5 | 6 | 7 |

Is created then the third column is taken and transposed using the “ ‘ ” modifier. The size then gives the dimensions of the array.

Q4.

Calculate the Truncation Error, at , in approximating the function   
For the approximation use the Taylor Series polynomial approximation of degree two, , expanded about the point

Choose your answer, to a best approximation, from the following:

1. -7.171875
2. -7.645227
3. -4.358405
4. -7.994173
5. None of these

Answer: E. In solutions

Q5.

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. Use starting points and

Choose your answer, to a best approximation, from the following:

1. 0.982274
2. 0.342803
3. 1.900475
4. 1.513896
5. None of these

Answer: C. In solutions pdf

Q6.

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

Choose your answer, to a best approximation, from the following:

2. None of these

Answer: C. In solutions

Q.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:

=

Choose your answer, to a best approximation, from the following:

1. ,
2. ,
3. ,
4. ,
5. None of these

Answer: C . In solutions

Q8.

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 .

Choose your answer, to a best approximation, from the following:

1. 8.65,
2. 6.85,
3. 10.00,
4. 8.65,
5. None of these

Answer: C. In solutions

Q9.

For the function and the points , and calculate Newton’s second divided difference

Choose your answer, to a best approximation, from the following:

1. 3.82975
2. 3.45287
3. 3.89453
4. 4.11185
5. None of these

Answer: D. In solutions

Q10.

Evaluate the following integral using three-point Gaussian Quadrature:

Choose your answer, to a best approximation, from the following:

1. 4.05745
2. 3.49066
3. 3.66519
4. 3.22703
5. None of these

Answer: A. In solutions