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Midterm Exam

Read the following instructions/rules before you start answering the questions:


-
- **You MUST keep a Backup Data plan, in case your internet service is interrupted. NO EXCUSE.**
 - **The exam time is 1 hour and an additional 15 minutes is for preparing the solution file and uploading. No more time time extension, and NO EMAIL SUBMISSION will be accepted.**
 - Prepare a Title page containing a) Your Name, b) Your BRACU ID #, c) Your Theory class Section # and d) Date and e) Exam Name.
 - Prepare the solution file in orderly fashion: first question first, then maintain the serial.
 - Always start an answer to a question from a fresh page.
 - Write legibly and neatly, FOLLOW the significant rule for all your calculations.
 - **YOU MUST WORK ALONE. INVOLVEMENT IN UNFAIR MEANS WILL BE REPORTED TO THE AUTHORITY.**

Suppose you have a system that can represent numbers up to 4 significant figures. Now



You are taking "Midterm Exam" as a timed exam. The timer on the right shows the time remaining in the exam. To receive credit for problems, you must select "Submit" for each problem before you select "End My Exam". **Show Less**

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[4 Marks] Leonard from the popular show "The Big Bang Theory" was given a project by his university to build a number system of 11 bits in binary. His wife Penny suggested that he should simply use 0s and 1s to fill up those 11 bits. On the other hand, his best friend Sheldon told him to follow Normalized technique. Can you guess two reasons behind Sheldon's suggestion?

Consider the function $f(x) = \cos(x)$ with nodes $\{-\pi/4, 0, \pi/4\}$. Now answer the following:

1. [2 Marks] Find the Lagrange bases.
2. [2 Marks] Find the interpolating polynomial for the given function using the above bases.

(i) What is the round-off error and the truncation error in numerical methods? Explain with examples for each case. (3 marks)

(ii) If you have data arriving in time, and you need the time derivative at the current time and can't look into the future then which divided difference method should be used? (1 mark)

Consider the following data set generated by a function, $f(x)$:


x	0.0	0.2	0.4
$f(x)$	1.01	1.22	1.49

1. [6 Marks] Find the interpolating polynomial of appropriate order using Newton's Divided/Difference method.
2. [2 Marks] Use the interpolating polynomial to approximate $f(0.25)$
3. [4 Marks] Add a data point $f(0.6) = 1.82$ to the given data, and find the new interpolating polynomial that include this new data point.

Consider the following data set:



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2. [6 Marks] For in interval $[-0.3, -0.1]$ compute the error bound (truncation error) if the above data is generated by the function, $f(x) = e^{2x} - \cos(2x)$
3. [2 Marks] Also compute the actual error.

MIDTERM EXAM SUBMISSION

Assignment submissions will close soon. To receive a grade, first provide a response to the prompt, then complete the steps below the **Your Response** field.

▼ Your Response due Aug 2, 2021 18:00 +06 (in 1 hour, 30 minutes) IN PROGRESS

Enter your response to the prompt. You can save your progress and return to complete your response at any time before the due date (Monday, Aug 2, 2021 18:00 +06). **After you submit your response, you cannot edit it.**


The prompt for this section

Strictly follow the following to properly submit your midterm exam solutions:

- Now prepare a single solution file containing the title page and the answer scripts in a .pdf or .jpg format.
- Rename your solution file in the format: **ID#_First or Last Name_Theory Section Number.pdf** (As for example: 12345678_Khan_9.pdf).
- Upload the solution file (Note you have to write the name of the file in the 'Description' box to upload successfully.
- Click the 'Submit' button and Click 'End My Exam' at the top.
- In case you face any technical problem submitting in time, you may email your solution to your section faculty including a) the screen shot



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- GOOD LUCK and Have a Nice Day.

[Choose Files](#) No file chosen[Upload files](#)

You may continue to work on your response until you submit it.

[Submit your response and move to the next step](#)[Staff Grade](#) NOT AVAILABLE


► Your Grade: Not Started

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