Assignment # 4

Question # 1 : A function is given by $f(x) = 2x^3 - e^x$ Now, Answer the following questions:

1. [2 marks] Find the first derivative of $f(x)$ using forward difference method at $x_0 = 2$ with step sizes of $h = 0.1, 0.01 \text{ and } 0.001$
2. [2 marks] Find the truncation errors corresponding to each step size.
3. [1 mark] State the relationship between the truncation error and the step size.
4. [2 marks] Now recalculate the first derivative of the given function using the central difference method for the given x_0 and the step sizes.
5. [3 marks] Repeat the truncation error calculation for the central difference method, and then state the relationship between the step size and the error in this case.

Question # 2 : Let $\beta = 2\, m = 4 e_{\min} = -1$ and $e_{\max} = 2$ Now answer the following questions:

1. [2 marks] Compute the minimum of $|x|$ for denormalized form.
2. [1 mark] Compute the Machine Epsilon value for the denormalized form.

3. [1 mark] State what you can see about the relation between Machine Epsilon value and the exponent.
4. [1 mark] Compute the Machine Epsilon value for the Normalized form.

Submission of the Assignment #4:

- Solve all problems above.
- Prepare a title page including

  # Your Name, Your ID#, Theory Section #.

- Prepare
  a single .pdf or .jpg file
  containing the tile page and the solution pages.
- To submit your assignment solution, visit the Submission Link (Click here). This will take you to a Google Form link.
- Fill up the Google Form link with correct information and upload the file there. You are done.

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