Instructions for preparing the solution script:

- Write your name, ID#, and Section number clearly in the very front page.

- Write all answers sequentially.

- Start answering a question (not the part of the question) from the top of a new page.

- Write legibly and in orderly fashion maintaining all mathematical norms and rules. Prepare a single solution file.

- Start working right away. There is no late submission form. If you miss the deadline, you need to use the make-up assignment to cover up the marks.

A. Consider the following function, $f(x) = 7e^{-5x}$. Based on these, answer the following questions:

1. (2 marks) Approximate the derivative of $f(x)$ at $x_0 = 1.0$ with step size $h = 0.1$ using the forward and central difference methods up to 5 significant figures.

2. (4 marks) Determine the upper bound of truncation error of $f(x)$ at $x_0 = 1.0$. Using step size $h = 0.1$ for the backward and central difference methods up to 5 significant figures.

3. (4 marks) Compute $f'(1.1)$ with step size $h = 0.1$ using backward difference method, and also calculate the relative error. Use 5 significant figures.

B. Read the following questions and answer accordingly:

1. (5 marks) Deduce an expression for $D_h^{(1)}$ from D_h by replacing h with $\frac{h}{3}$ using Richardson extrapolation method.

2. (3 marks) If $f(x) = -9e^{7x} + 4x^3$, compute $D_{0.2}^{(1)}$ at $x = 2.7$ using Richardson extrapolation method up to 4 significant figures and calculate the truncation error.

3. (2 marks) Following B(2), if $f(x) = -9e^{7x} + 4x^3$, compute $D_{0.2}^{(2)}$ at $x = 2.7$ using Richardson extrapolation method up to 4 significant figures .