

Assignment 6 - Computational Mathematics Week 8

Instructions

For each problem, please include:

- Source code with comments explaining all important steps.
- A screenshot of the program output and explanation.
- Provide graphs or tables where applicable to visualize results.
- Provide detailed explanations for your approaches and results.

Save your answers as a PDF report and submit it to the Moodle.

Task 1: First Derivative Using Newton's Forward Difference Formula.

Given the data: $x=[0,2,4,6,8]$ $y=[1,4,16,36,64]$

Estimate dy/dx at $x=0$ using Newton's Forward Difference Formula.

Task 2: Second Derivative Using Newton's Forward Difference Formula.

Using the same data from Task 1, estimate d^2y/dx^2 at $x=0$.

Task 3: First Derivative Using Newton's Backward Difference Formula.

Given the data: $x=[5,6,7,8,9]$ $y=[10,16,26,40,58]$

Estimate dy/dx at $x=9$ using Newton's Backward Difference Formula.

Task 4: Derivative Using Unequally Spaced Values.

Given the unevenly spaced data: $x=[1,2,4,7]$ $y=[3,6,12,21]$

Estimate dy/dx at $x=3$ using Lagrange's Interpolation Formula for Derivatives.

Task 5: Maxima or Minima of a Tabulated Function.

Given the data: $x=[2,4,6,8,10]$ $y=[5,7,8,6,3]$

Determine the value of x where y has a maximum or minimum.