Q1. A train is moving along a track, and its position at different time intervals has been recorded. The data is stored in an ASCII text file with the first column representing time t (in seconds) and the second column representing the train's position s(t) (in meters).

Your task is to write a Python program that performs both numerical differentiation and numerical integration:

a) Numerical Differentiation: Compute the **velocity of the train** at each recorded time point using the **second-order accurate finite difference method ($O(h^2)$)** for all points, including the first and last points.
b) Numerical Integration: Compute the **total distance travelled by the train** by integrating the velocity over the given time period.

No library functions allowed for differentiation and integration.

Code should be modular, i.e. with functions. Students can work in groups of two. One person can do the reading/input. The other person can do the differentiation/integration. Main code can be made as a joint effort of both the students. Assignments are to be submitted individually.

Q2. You are given a **partially implemented Python program** that is supposed to compute the **second derivative** of a function $f(x)$ using **numerical differentiation**. The function is sampled at unevenly spaced intervals. Your task is to **correct or complete the given code** so that it correctly computes the second derivative of $f(x)$ at each data point.

The function $f(x)$ is provided as an array of points in an ASCII text file.

You are expected to **modify or add functionality** to correctly compute the second derivative using methods suitable for **non-uniform intervals**. You may use techniques such as interpolation or higher-order finite differences.