

Tutorial (Advanced Programming) Worksheet 4:

Assignment 1: Linear Interpolation

Consider an example where you have an unknown function $f(x)$, and you are told that $f(x_a) = y_a$ and $f(x_b) = y_b$. Now you are asked to provide the result of the function evaluation at x_r where $x_a \leq x_r \leq x_b$. Write a program which uses equation 1 to program a function which gets the known values and computes the function value at the point x_r .

$$y_r = y_a + (y_b - y_a) \frac{(x_r - x_a)}{(x_b - x_a)} \quad (1)$$

Assignment 2: Guessing Game

For this Assignment we are going to implement a guessing game. The program is supposed to pick a random *integer* number from a user-given interval of $[a, b]$. Each time the user makes a guess the program has to tell the user if her guess is smaller than or larger than the guess. The program ends when the user successfully guesses the number.

Homework assignment 1: A more Advanced Guessing Game

As a Homework try to change the Assignment 2, this time the user gives the interval $[a, b]$, and picks up a number from that interval. Now, the program tries to make guesses, and each time the user is asked to input if the guess is smaller than or larger than the picked number.

HINT: The program can divide the interval into two equal sub-intervals, and choose the mid-point as the guess. Now you should continue until the sub-interval consists of only a single number.

Questions:

Answer the following questions:

- In Assignment 1, What would happen if $x_a = x_b$? How could you avoid that?
- Using the Hint for Homework assignment 1, how many tries does the program need at most, to guess the correct solution? Please elaborate your answer!