ATILIM UNIVERSITY

Department of Computer Engineering

CMPE 114 Computer Programming - II

2019-2020 SPRING

Assignment I- Arrays

Due date: May 11, 2020 Monday 23.55

Write a C Program to calculate the derivative of an entered polynomial.

Two functions and a main function should be defined:

- **polynomial function:**

  Define this function for outputing the polynomial. This function will recieve the coefficients array and the degree of the polynomial from the main function, and outputs the polynomial.

- **find_derivative function:**

  Define this function to calculate the derivative. This function will recieve the coefficients array, the degree of polynomial and the order of derivative to be calculated. Output the resulting polynomial.

- **In the main function:**

  Ask user to input a polynomial degree (between 1 and 10)

  Input the polynomial coefficients starting from the highest degree to lowest into a 1D array.

  Output the entered polynomial by calling **polynomial function.**

  Call **find_derivative function** to calculate the derivative (of desired degree) of the polynomial.

NOTE: Assume that the entered polynomial is: $\boldsymbol{f(x) = 4x^3 + 2x^2 - 9x + 16}$

Then, based on the degree of the derivatives the following results will be obtained:

The 1st derivative is: $\boldsymbol{f'(x) = 12x^2 + 4x - 9}$

The 2nd derivative is: $\boldsymbol{f''(x) = 24x + 4}$

The 3rd derivative is: $\boldsymbol{f'''(x) = 24}$

According to this example, possible executions (SAMPLE RUN) are given below:

SAMPLE RUN-1

Enter the degree of polynomial equation(1-10): **3**

Enter the coefficient of x to the power 3: **4**

Enter the coefficient of x to the power 2: **2**

Enter the coefficient of x to the power 1: **-9**

Enter the coefficient of x to the power 0: **16**

Entered polynomial:

f(x)=4x^3+2x^2-9x^1+16

Which degree of derivative you want to calculate?**1**

1. derivative: df(x)=12x^2+4x^1-9

SAMPLE RUN-2

Enter the degree of polynomial equation(1-10): **3**

Enter the coefficient of x to the power 3: **4**

Enter the coefficient of x to the power 2: **2**

Enter the coefficient of x to the power 1: **-9**

Enter the coefficient of x to the power 0: **16**

Entered polynomial:

f(x)=4x^3+2x^2-9x^1+16

Which degree of derivative you want to calculate? **2**

2. derivative: df(x)=24x^1+4

SAMPLE RUN-3

Enter the degree of polynomial equation(1-10): **3**

Enter the coefficient of x to the power 3: **4**

Enter the coefficient of x to the power 2: **2**

Enter the coefficient of x to the power 1: **-9**

Enter the coefficient of x to the power 0: **16**

Entered polynomial:

f(x)=4x^3+2x^2-9x^1+16

Which degree of derivative you want to calculate? **3**

3. derivative: df(x)=24

SAMPLE RUN-4

Enter the degree of polynomial equation(1-10): **3**

Enter the coefficient of x to the power 3: **4**

Enter the coefficient of x to the power 2: **2**

Enter the coefficient of x to the power 1: **-9**

Enter the coefficient of x to the power 0: **16**

Entered polynomial:

f(x)=4x^3+2x^2-9x^1+16

Which degree of derivative you want to calculate? **4**

4. derivative: df(x)=0

Notes on Grading:

This homework will be graded out of 100.

- You should add comments to your code, to explain your work in detail. (This part is 10 pts)
- Code Execution - Working Correctly without Errors (20 pts). If there are some errors and your code can not be compiled, then it is evaluated by partial points – out of 80 pts.

IMPORTANT NOTES:

- The name of your homework file should be **"yoursurname_name.c"**
- You should use indentation and comments in your code.
- You should upload your homework file to the Moodle system until **May 11, 2020 Monday 23.55. Late homeworks will NOT be graded.**
- **Cheating will NOT be tolerated.** Special software will be used to verify if the submitted homework is your original work or copied from someone/somewhere else. If the code similarity between any two or more submissions is higher than %90, we also examine and compare these codes by eye. If any case of cheating is detected, at any time, **you will get ZERO from your homework.**