

Problem A.2

Polynomial Manipulation

Due Date: 4/15/2019

Folder: Applied

File Name: A2_Polys_Name.py

Points: 5 points

Problem Background

When implementing Newton's method, usually you must compute the derivative by hand, or approximate it with some other method. However, when working with polynomials, the simplicity of these functions allows the process to be automated in the program.

With this program, you will write functions to evaluate a polynomial at a point, and differentiate a polynomial. To do this, we must find a better way to represent a polynomial than using a `lambda` function. The structure of a polynomial is such that we can represent it with a list. The elements of the list will hold the coefficients of the polynomial, using the standard basis.

For example, if we have the polynomial

$$p(x) = 4x^4 - 8x^3 + 2x - 9,$$

one way we can represent this in a list of length 5 as

$$\mathbf{p} = [-9, 2, 0, -8, 4].$$

Note that the i^{th} element of the list is the coefficient for the x^i term in the polynomial. Now we can use this list to evaluate $p(x)$ and even calculate a new list to represent $p'(x)$ or $\int p(x) dx$.

Program Criteria

Write a program that does the following:

- Define a polynomial `p` in whatever way you choose to represent it in your code. Be sure to explain how your polynomial is represented using comments.
- One `def` function that evaluates a polynomial at a given point.
- One `def` function that returns the derivative of a polynomial.
- One `def` function that computes the definite integral $\int_a^b p(x) dx$.
- Use your functions to print out:
 - ★ Your polynomial evaluated at a point c , that is $p(c)$, with appropriate text,
 - ★ The derivative of your polynomial evaluated at a point c , that is $p'(c)$, with appropriate text,
 - ★ The definite integral of your polynomial, that is $\int_a^b p(x) dx$.

Deliverables

Place the following in a folder named **Applied** in your repository:

- A Python file `A2_Polys_Name.py` that satisfies the program criteria.