

Cubic Polynomial Derivatives

1 Introduction

A single-variable, cubic polynomial with integer coefficients is any function of the form $f(x) = ax^3 + bx^2 + cx + d$ where a, b, c , and d are integers with $a \neq 0$. From previous math courses, you have learned how to compute its derivative $f'(x)$.

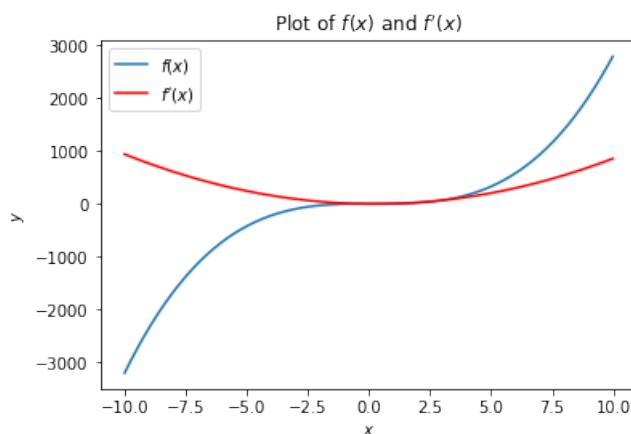
2 Objective

The goal of this activity is to develop a function, named `cube_deriv`, that plots (with `plt.plot`, not `plt.scatter`) the given cubic $f(x)$ in blue and its derivative $f'(x)$ in red from $x = -10$ to $x = 10$ using at least 1000 points. Your plot should include axes labels, a legend, and a title. This function will be implemented in Python.

Assume that your Python function will accept as an input the four variables a , b , c , and d . It is guaranteed that $1 \leq a \leq 10$, $-10 \leq b \leq 10$, $-10 \leq c \leq 10$, and $-10 \leq d \leq 10$. The output of your function should be a single plot fitting the description given above.

3 Example

For the values $a = 3$, $b = -2$, $c = 0$ and $d = 5$, `cube_deriv(3,-2,0,5)` should produce the following plot:



4 Additional Notes

1. Consider using a list comprehension to solve this problem and be sure to review some of the in-class examples.
2. Include `plt.show()` as the last line of your function.
3. When writing the labels, if your label needs the single quote character, then use double quotes around your string characters to avoid errors.

5 Grading Criteria

This project is worth a total of 10 points:

- (3 points) Introduction and Discussion - Introduce the problem and explain how your algorithm/function works.
- (5 points) Algorithm and Implementation - The algorithm designed and implemented in Python solves the problem.
- (2 points) Neatness and Timeliness - Your write-up is neat, clear, and turned in on time. The assignment must be typed (as a Jupyter notebook) and completed by 11:59pm on September 16th.