

# Project 1 Writeup

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## 1 Attribution

- <https://www.geeksforgeeks.org/python/python-while-loop/>

This was to make sure I was using the correct notation with a while loop.

- <https://www.integral-calculator.com>

To find the correct answer to the integral so I could calculate error.

- [https://python4physics.in/program/python/program.php?menu\\_id=14&submenu\\_id=2#gsc.tab=0](https://python4physics.in/program/python/program.php?menu_id=14&submenu_id=2#gsc.tab=0)

This helped me figure out how to use existing Python libraries to generate the Legendre polynomials.

- [https://matplotlib.org/stable/api/\\_as\\_gen/matplotlib.axes.Axes.grid.html](https://matplotlib.org/stable/api/_as_gen/matplotlib.axes.Axes.grid.html)

To learn a bit more about adding grids in plots.

- <https://matplotlib.org/stable/users/explain/colors/colors.html>

I wanted to see if I could add custom colors to the lines in plots. Turns out you can!

- [https://www.w3schools.com/python/matplotlib\\_subplot.asp](https://www.w3schools.com/python/matplotlib_subplot.asp)

How to use the subplot function.

## 2 Timekeeping

The code took around four hours to write.

## 3 Language, Libraries, and Lessons Learned

### **3.1 Language**

The language for this program was Python.

### **3.2 Libraries**

For the libraries, I used numpy, math, prettytable, scipy, matplotlib, and scipy.special. I really liked prettytable because I thought it gave my plots some character and was relatively easy to look up. The libraries used for this project were great to use; the documentation on them was well written and clearly laid out.

### **3.3 Lessons Learned**

It was good to refamiliarize myself with the different loops, as it has been a while since I worked with them. Making the subplots using a for loop inside of a for loop was also challenging, but good fun, as I liked to think of it as making the elements in a matrix.

## **4 Important Figures**

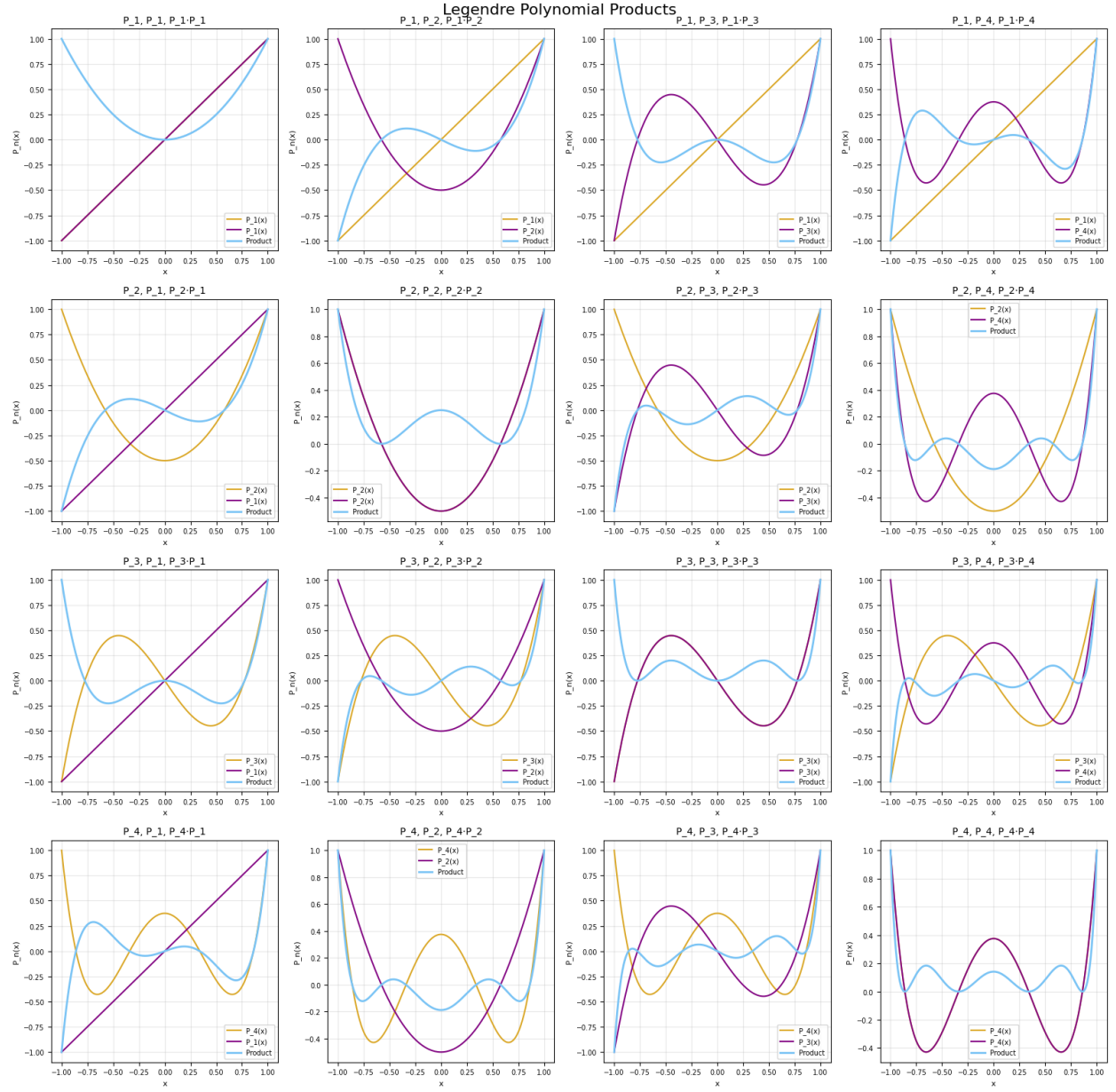


Figure 1: A four by four grid of subplots, each one showcasing  $P_i$ ,  $P_j$ , and  $P_i * P_j$ , for the column number (i), and row number (j), respectively.