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PROJECT 1
MAKE YOUR OWN FUNCTION

- **Introduction**
  In the enchanting world of wizardry and magic, every student, witch, wizard, or muggle, at Hogwarts School of Witchcraft and Wizardry strives to achieve academic excellence. As part of their academic journey, students receive grades and credits for various magical subjects. To help students keep track of their academic progress, I created a function which calculates their GPA for that term. The GPA calculator is a tool designed for wizarding students to compute their Grade Point Average (GPA) based on the grades they receive in different subjects for the OWLs. The GPA and marksheet are essential tools to help students plan their academic path and unlock their full potential in the magical world.

- **Purpose**
  The purpose of the GPA calculator is to determine the GPA of a student based on the subject's points and the credits. It is not just a numeric tool; it also provides valuable insights into the student's performance by assigning letter grades and displaying their academic achievements into a marksheet along with their GPA. It helps students understand their strengths and the areas where they need to improve using a graph that plots the credits of the subject against how much they have scored.

- **Equation/ Algorithm**
  Below is a step-by-step algorithm of the function I created.
  Step 1: Take input.
  Step 2: Check if input is valid list.
  Step 3: Iterate over length of list.
    Step 3.1: Check if list contains vectors.
    Step 3.2: Check if each vector is of length 3.
    Step 3.3: Check if subject name is a character.
    Step 3.4: Check if credit is a number and is between 0 and 12.
    Step 3.5: Check if points is a number.
  Step 5: Iterate over length of list and assign grade and individual GPA to each subject.
  Step 6: Save all the values in respective vectors.
  Step 7: Calculate weighted GPA using this formula:

$$\text{Weighted GPA} = \textit{Individual GPA * credit}$$

  Step 8: Calculate final GPA using this formula and round off to 2 decimal places:

$$\text{GPA} = \frac{Sum\ of\ Weighted\ GPA}{Sum\ of\ credits}$$

  Step 9: Make a data frame looking like a marksheet using subject, points, grade and credits.
  Step 10: Plot credits against the points achieved.
  Step 11: Return the data frame and the GPA inside a list.

- **Input Specifications**
  The input must be a list, with vectors inside it. Each vector should be of length 3. The vector should be in such a format:
  c("Subject Name", Credits for that subject, Points for the subject)

- **Output Information**
  - **Returned Objects**
    The function returns a list containing a data frame and a GPA variable. The data frame consists of the Subject Names, Credits, Points achieved, and the Grades achieved in the respective subject like a marksheet. The variable consists of the final GPA of the student for the list of subjects they gave as input. To print only the marksheet, type "variable_with_stored_function$Marksheet" and to only print the GPA, type "variable_with_stored_function$GPA".

  - **Visual Representations**
    Inside the function is also a scatter plot of Credits of each subject against the Individual GPA of each subject. Each subject is plotted with a different color which is referenced in the legend.

- **Conclusion**
  In conclusion, the function I created, provides not only a calculated GPA but also an insightful marksheet and a visual representation of their progress. The GPA calculator is a valuable tool, assisting students in assessing their academic performance and planning their academic journey.