Task 1

To find the largest triangle formed by any combination of 3 points in a dataset, a Python3 script is used. The script reads in a CSV file, parses the data into a list of points, and iterates over all possible combinations of 3 points. The area of each triangle is calculated using the Shoelace Formula or another appropriate method, and the largest area and 3 points that form the triangle with the largest area are tracked. Finally, the vertices of the largest triangle are written to a CSV file named safetriangle.csv in increasing order of x-coordinates then y-coordinates.

Task 2

To solve the problem of finding the largest safe polygon that can be formed by a set of points, I start by reading in the points from a CSV file using the csv module. Next, I use a nested loop to iterate through all possible combinations of three points and calculate the area of the triangle formed by each combination. I keep track of the three points with the largest area and update the maximum area as necessary.

Once I have found the three points with the largest area, I check if any additional points can be added to form a larger polygon. To do this, I use another nested loop to iterate through all possible combinations of three points (including the current max points) and check if the combination forms a convex polygon. If it does, I calculate the area of the polygon formed by the three points and all additional points, and update the maximum area and max points if necessary.Finally, I sort the max points in increasing order of x-coordinates and y-coordinates, and write them to a new CSV file named "safepolygon.csv" using the csv module.

References

Strang, G. (2014). Linear algebra and its applications (4th ed.). Cengage Learning.

(Shoelace formula)