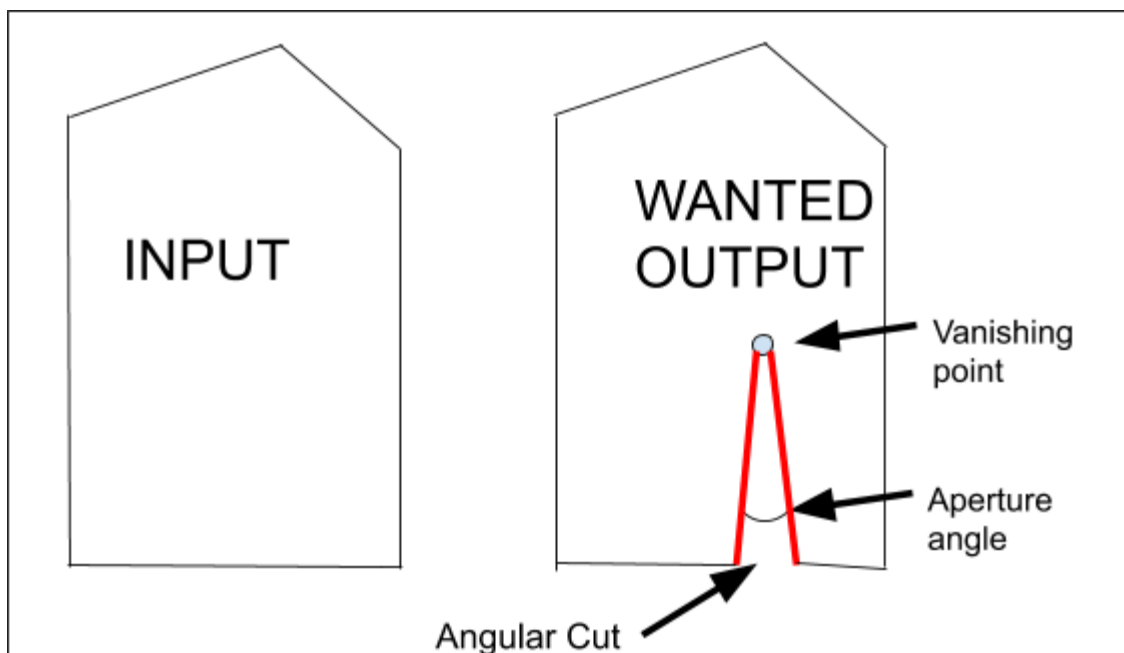


This is a data structure and software engineering exercise. The objective is to assess your knowledge of data structures, OOP, and unit testing. You will also need some basic geometry as well. You should not have to use any image processing or ML skills to solve this exercise. This exercise has three questions.

### Exercise 1:

Clothing is made of patterns that are cut and sewn together. In most existing fashion Computer Assisted Drawing software, patterns are stored in memory as data structures representing 2D points, and lines connecting them. For this exercise, you must:

1. Create a Python class to represent a 2D clothing pattern using common data structures. Use any data structure (lists, tuples, dictionaries, graphs, etc.) that you deem necessary to represent the points and lines of the pattern.
2. Implement the “create angular cut ” operation method in the Pattern class. The “create angular cut ” operation should take as input four parameters (1) the original 2D polygon, (2) the coordinates of a vanishing point, (3) the cut’s aperture angle (4) the line of the polygon to cut. Then, the operation must modify the pattern’s data structures to produce a transformed pattern with the angular cut . The following diagram is used to help you visualize the operation, the polygon to the left is the operation INPUT and the polygon to the right is the WANTED OUTPUT for the “create angular cut ” operation. The resulting angular cut is shown as two red lines in the diagram.



You may use the following sample input/output pairs:

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Input polygon points coordinates:

*(0, 0),(0, 100),(50, 150),(75, 150),(100, 100),(100, 0)*

Input polygon lines (as indices to the point array)

*[0, 1],[1, 2],[2, 3],[3, 4],[4, 5],[5, 0]*

*Vanishing point: (50, 50)*

*Angle: 53.13°*

*Line to cut: [0, 1]*  
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Output polygon points:

*(0, 0), (0, 100), (50, 150), (75, 150), (100, 100), (100, 0), (0, 25), (50, 50), (0, 75),*

Output polygon lines:

*[0, 6],[6, 7],[7, 8],[8, 1],[1, 2],[2, 3],[3, 4],[4, 5],[5, 0]*

3. Implement a unit test for the cut angle operation and identify any other unit tests you might need for this development.

**What we are looking for in this exercise:** First and foremost, the exercise must be correct.

Additionally we will also consider code legibility. So, if you have some extra time at the end, please document the methods using Python multiline comments and try to use good names for variables and a consistent indenting style. Also comment your code to make it legible.