

End Sem Part-A Report

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1 Synopsis of the Problem

We are given a defined rectangular domain whose sides are in ratio as that of the golden mean which is approximately equal to 1.680. We are asked to fit three circles and four squares in it such that they do not overlap.

2 Aim of the problem

We have to create a script which takes the dimensions of the given figures which are given in input.txt and arranges them in the given rectangular region. The script should also give back the an output.txt containing coordinates of the figures placed.

3 Logic Involved in Solving the Problem

Once we define the rectangular domain we fix the smallest square at the bottom left of the domain and the biggest circle at the bottom right of the domain. We also fix the smallest circle at the upper left part of the domain. After this we build other figures by using the fixed figures as a basis. We also build conditions where the size of domain is not sufficient for all the figures to fit it. In such cases one or more constituent figures need to be excluded from the plot.

4 Algorithm Involved in Writing Scripts

To solve this problem we take help of bash and python scripts

4.1 Creating a bash script to get input

We create a bash script named **test2.sh** which takes **input.txt** as input. Using sed and awk commands, we filter out the measurements of the rectangular domain and the figures which are required to be fit into the rectangular domain.

4.2 Passing variables onto the Python Script

After extracting the required values we execute the python script **test3.py** in the bash script created and pass on the variables. We can pass variables by storing each variable in a file and writing code to read files in python, thus passing the variables.

4.3 Constructing the Rectangular Domain

Once the variables are imported we convert the length and breadth from string to float datatype. Then we plot the domain by using matplotlib.pyplot library whose reference name that we used is ax here.

4.4 Plotting Circle and Square at Corners

Before plotting the smallest circle and square at the left side of domain we first check if they will be able to fit inside the domain. Then we plot them if the domain dimensions are large enough.

4.5 Stacking other squares at the top of the smallest square

We plot the other squares in increasing order of sizes while checking if they will be able to fit inside the given domain. If not then one or more square will have to be excluded from the plot depending upon the size of the rectangular domain.

4.6 Placing other circles

We plot one circle at bottom right of the domain and plot the other circle at the bottom tangentially to the circle plotted at the corner. While doing so we check if the width of the rectangular domain is sufficient to accommodate both the circles. If not the algorithm will exclude the middle circle or both the circles if the domain is too small.

4.7 Outputting the Coordinates of the plotted figures

While plotting each figure we use the write functions. We first open the file **output.txt** and append the coordinates of each figure using the write function.

5 Configuration of the figures packed

