MECE 4606 Digital Manufacturing

Spring 2024

Assignment I

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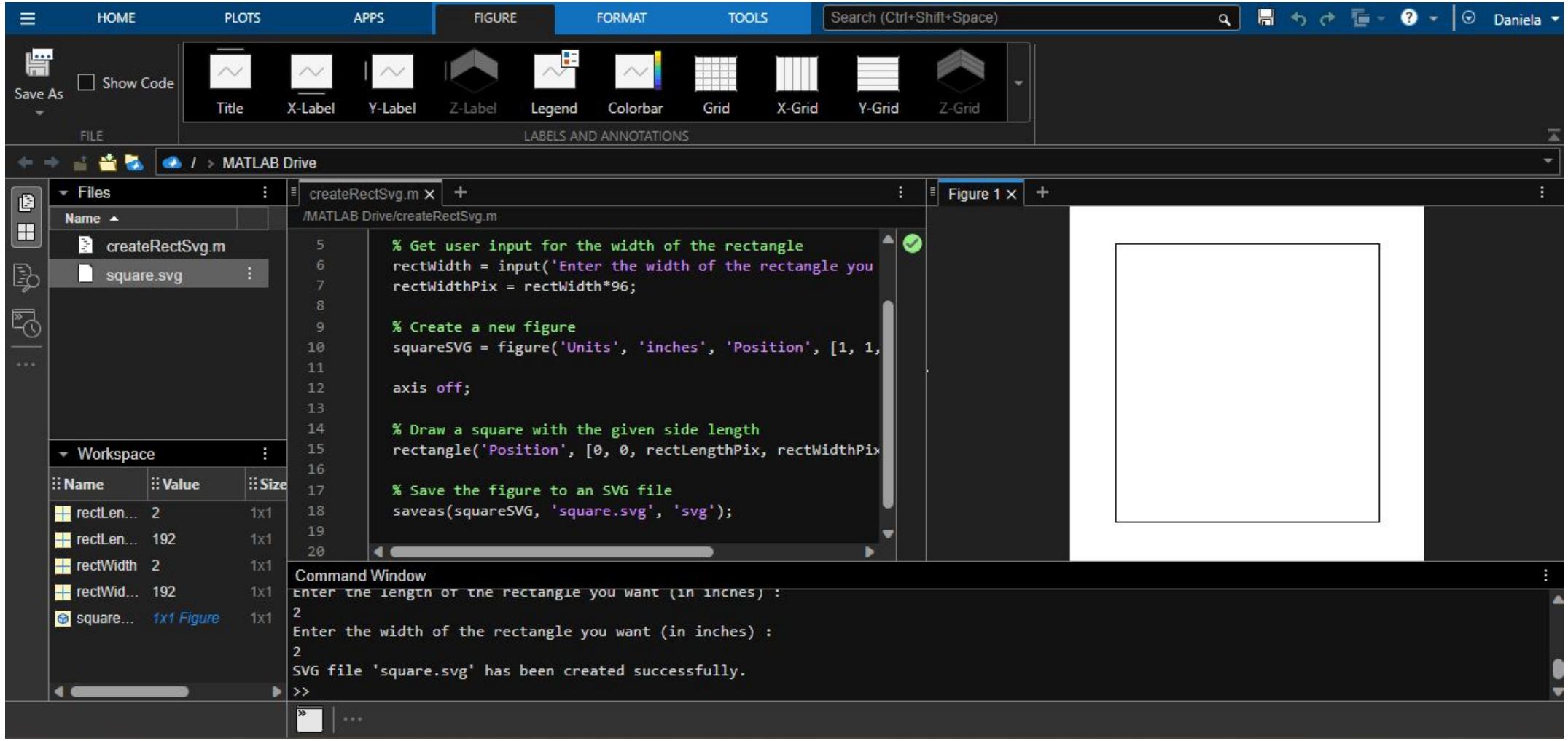
and Nico Primavera (ncp2136)

Submission: 2/11/24 at 2:00 pm

Grace Hours: 96 before submission

106 after submission

Preliminary Assignment - Program Inputs and Outputs

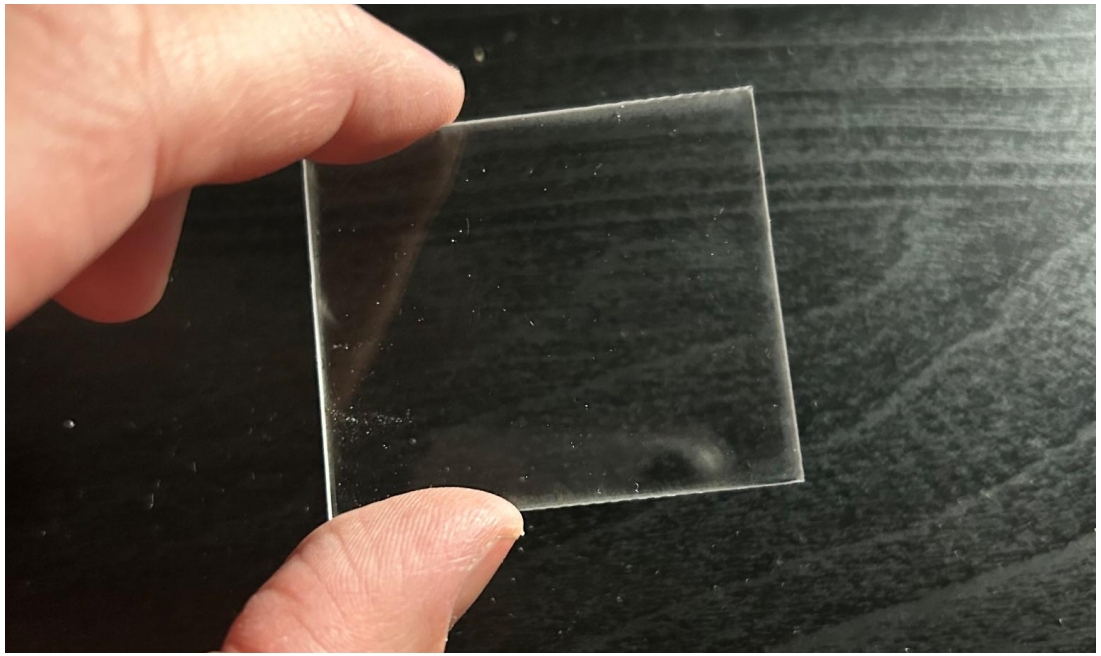


Preliminary Assignment - SVG Output

```
<?xml version="1.0"?>
<!DOCTYPE svg PUBLIC '-//W3C//DTD SVG 1.0//EN'
        'http://www.w3.org/TR/2001/REC-SVG-20010904/DTD/svg10.dtd'>
<svg xmlns:xlink="http://www.w3.org/1999/xlink" style="fill-opacity:1; color-rendering:auto; color-interpolation:auto; text-rendering:auto; stroke:black; stroke-linecap:square;
stroke-miterlimit:10; shape-rendering:auto; stroke-opacity:1; fill:black; stroke-dasharray:none; font-weight:normal; stroke-width:1; font-family:'Dialog'; font-style:normal; stroke-linejoin:miter;
font-size:12px; stroke-dashoffset:0; image-rendering:auto;" width="198" height="198" xmlns="http://www.w3.org/2000/svg"
><!--Generated by the Batik Graphics2D SVG Generator--><defs id="genericDefs"
 /><g
 ><defs id="defs1"
   ><clipPath clipPathUnits="userSpaceOnUse" id="clipPath1"
     ><path d="M0 0 L198 0 L198 198 L0 198 L0 0 Z"
     /></clipPath
   ></defs
   ><g style="fill:white; stroke:white;"
   ><rect x="0" y="0" width="198" style="clip-path:url(#clipPath1); stroke:none;" height="198"
   /></g
   ><g style="fill:white; text-rendering:optimizeSpeed; color-rendering:optimizeSpeed; image-rendering:optimizeSpeed; shape-rendering:crispEdges; stroke:white; color-interpolation:sRGB;"
   ><rect x="0" width="198" height="198" y="0" style="stroke:none;"
   /></g
   ><g style="text-rendering:geometricPrecision; stroke-width:0.6875; color-interpolation:linearRGB; color-rendering:optimizeQuality; stroke-linecap:butt; image-rendering:optimizeQuality;"
   ><path d="M26 176 L172.88 176 L172.88 21.44 L26 21.44 Z" style="fill:none; fill-rule:evenodd;"
   /></g
 ></g
></svg
>
```

Preliminary Assignment - Physical Output

With this preliminary assignment, we were able to successfully use MATLAB to create an svg of a 2” by 2” square. We then took our svg output and cut out a the square of acrylic using the Makerspace laser cutter. The result can be seen in the image to the right.



Now for the full box

Description of the Software - Part 1 of 2

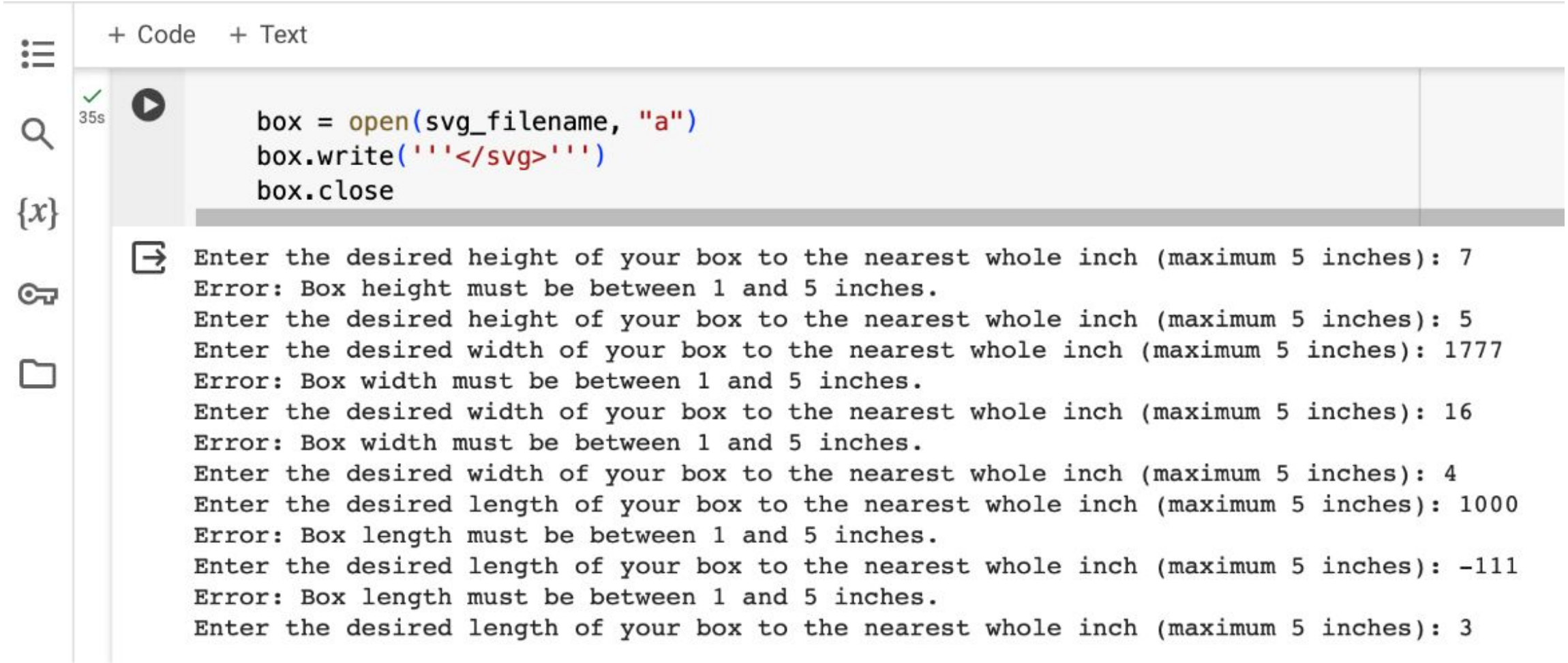
Our software can be broken into 4 major sections.

1. The first section of the code lays out the math needed to generate the fractal that will be engraved on the surface of two side panels.This code was written with the help of https://courses.cs.washington.edu/courses/cse142/01sp/misc/fractal_lab.htm
2. The second section takes in user input to generate all the panels of the box which we further break down into 2 unique functions. The function drawTopBottom() draws the top and bottom panel onto the svg file while function drawSide() is called to draw the remaining four panels. These two functions take in inputs of width, length, or height and the x,y coordinates for positioning. We have limited the user to only insert width, length and height integer values that are under 5 inches to ensure it fits on the 12” x 18” acrylic sheet. If they enter values greater than 5 inches or a value that is not an integer, we produce a warning and let them try again.

Description of the Software - Part 2 of 2

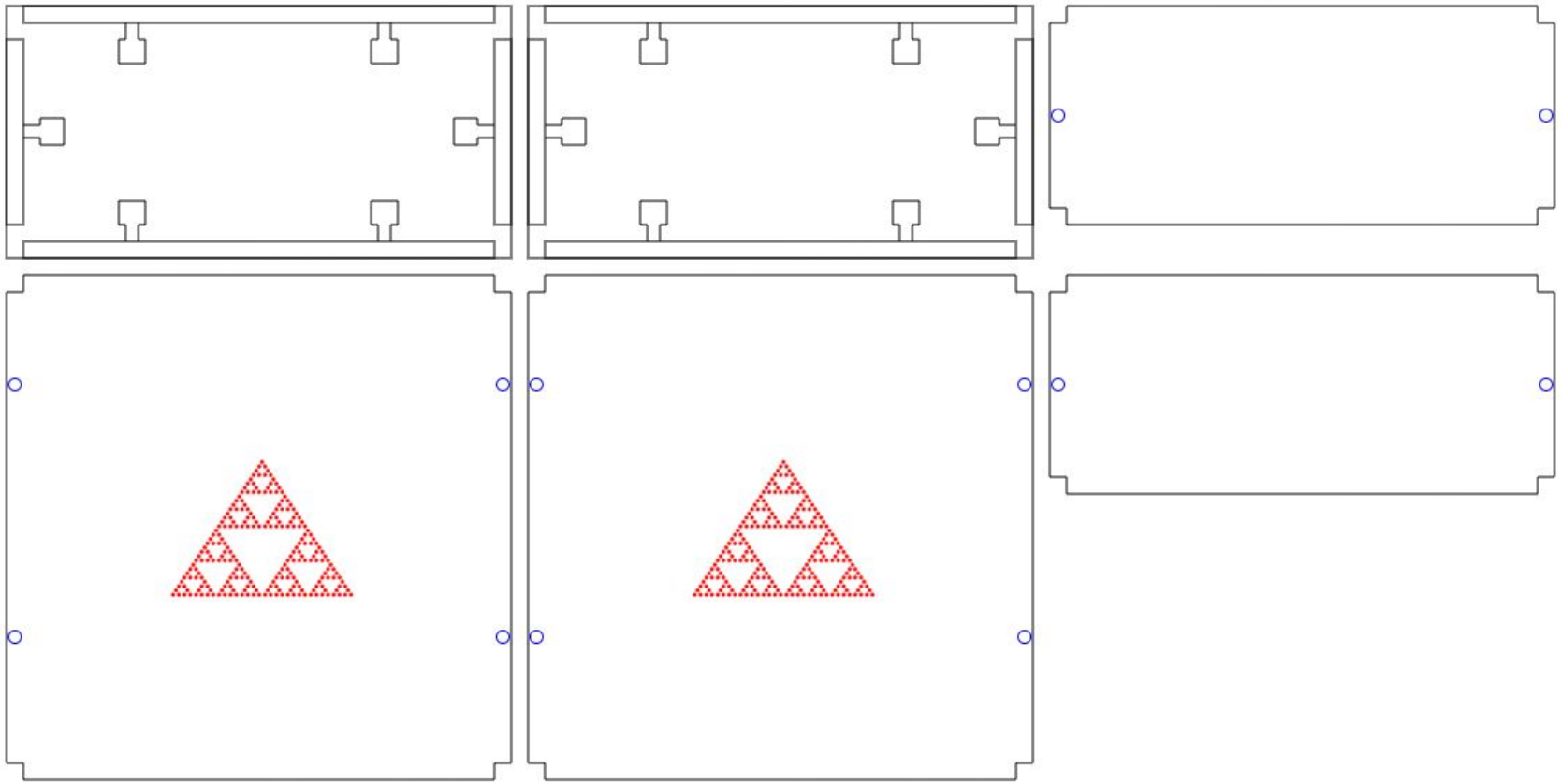
3. The third part of our code is comprised of two functions that draw the cutouts for the t-slots used for assembly of the box. Function drawTSlots() draws slots on the sides of the top and bottoms panels associated with width and drawTSlotsSides() draws slots on the sides of the top and bottom panels associated with length.
4. The last part of the code is used to draw the cutouts for the screws used for assembly of the box. Function drawHoles() draws holes for the smaller panels and drawHoles2 draws holes for the larger panels.

Software inputs length, width and height of box and detects errors



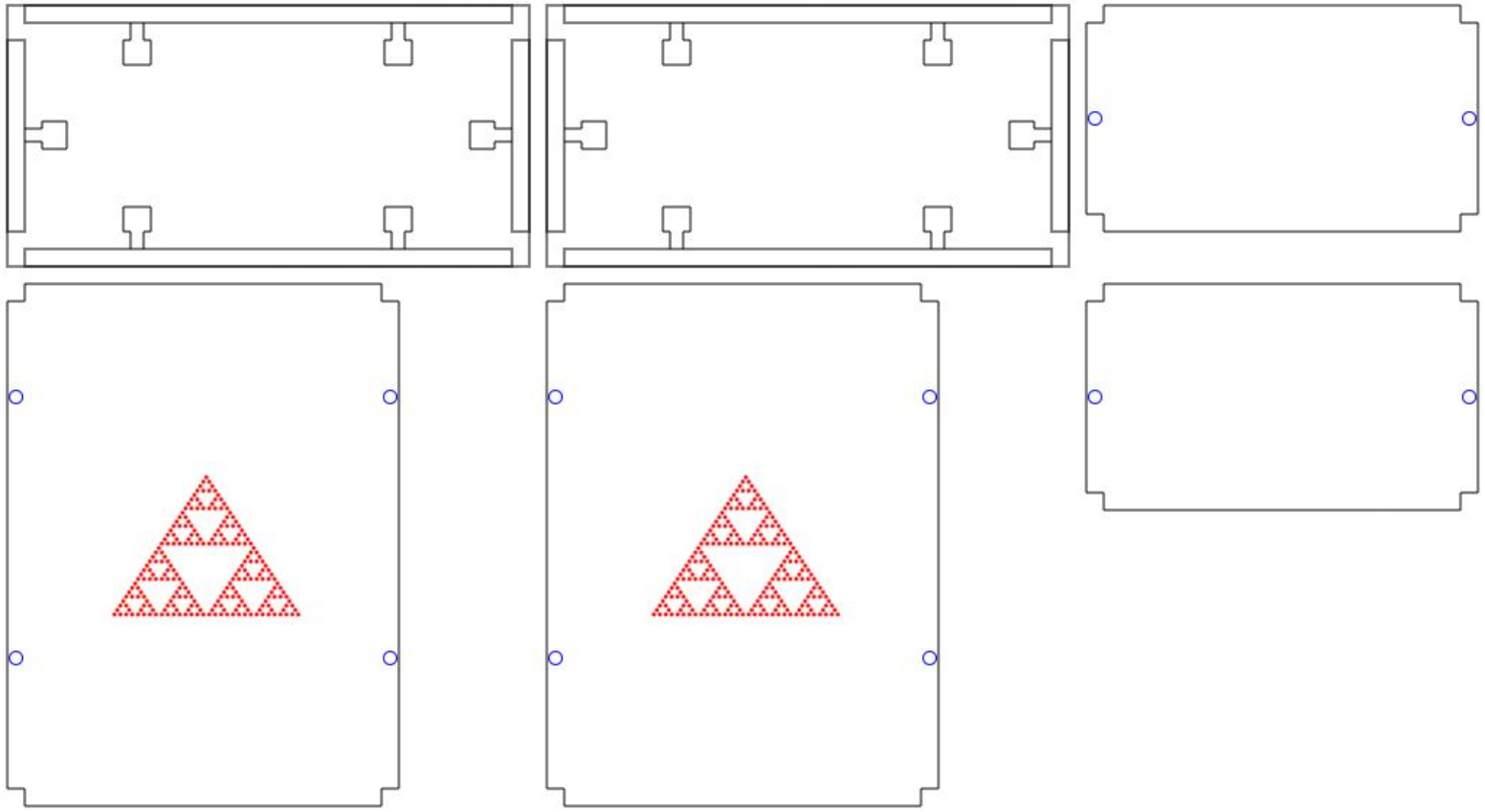
Example 1 showing Input Parameters & Output Flat Patterns

```
Enter the desired height of your box to the nearest whole inch (maximum 5 inches): 4
Enter the desired width of your box to the nearest whole inch (maximum 5 inches): 4
Enter the desired length of your box to the nearest whole inch (maximum 5 inches): 2
```



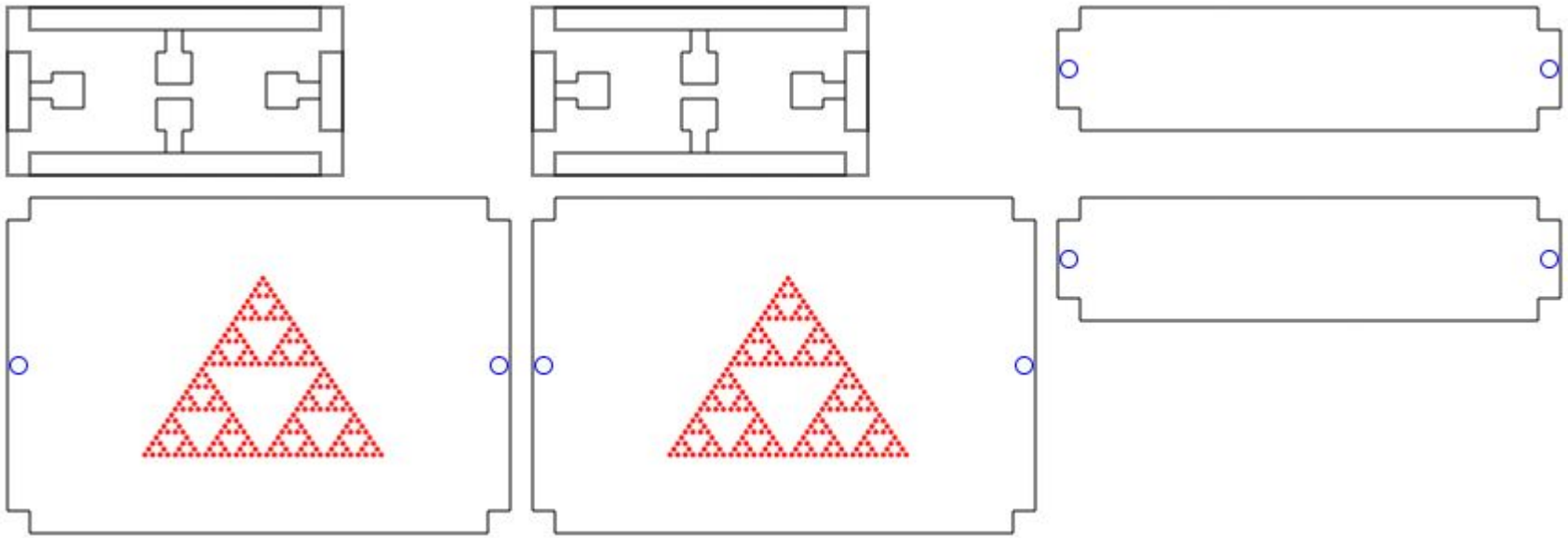
Example 2 showing Input Parameters & Output Flat Patterns

```
Enter the desired height of your box to the nearest whole inch (maximum 5 inches): 3
Enter the desired width of your box to the nearest whole inch (maximum 5 inches): 4
Enter the desired length of your box to the nearest whole inch (maximum 5 inches): 2
```



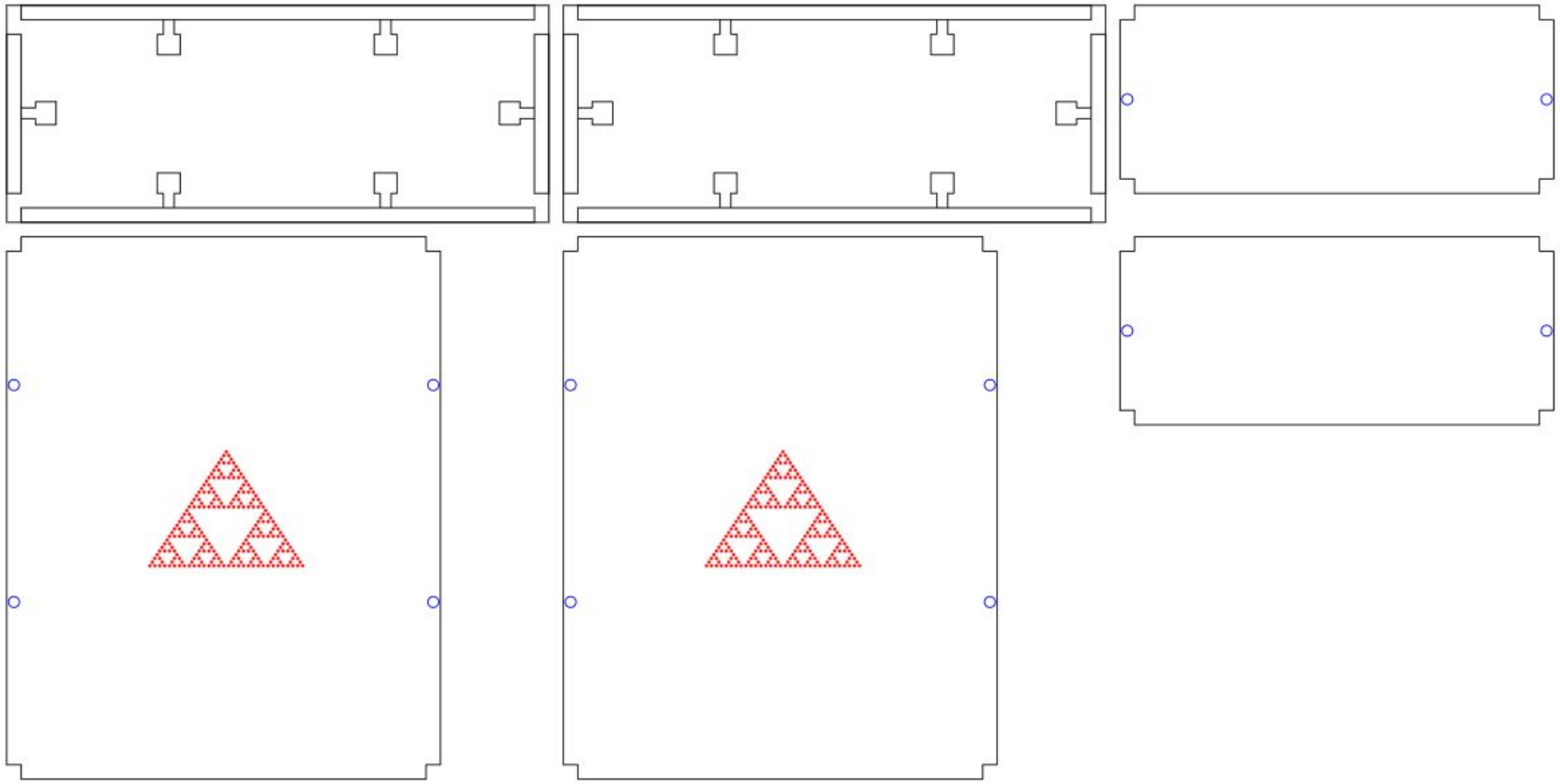
Example 3 showing Input Parameters & Output Flat Patterns

```
Enter the desired height of your box to the nearest whole inch (maximum 5 inches): 3
Enter the desired width of your box to the nearest whole inch (maximum 5 inches): 2
Enter the desired length of your box to the nearest whole inch (maximum 5 inches): 1
```

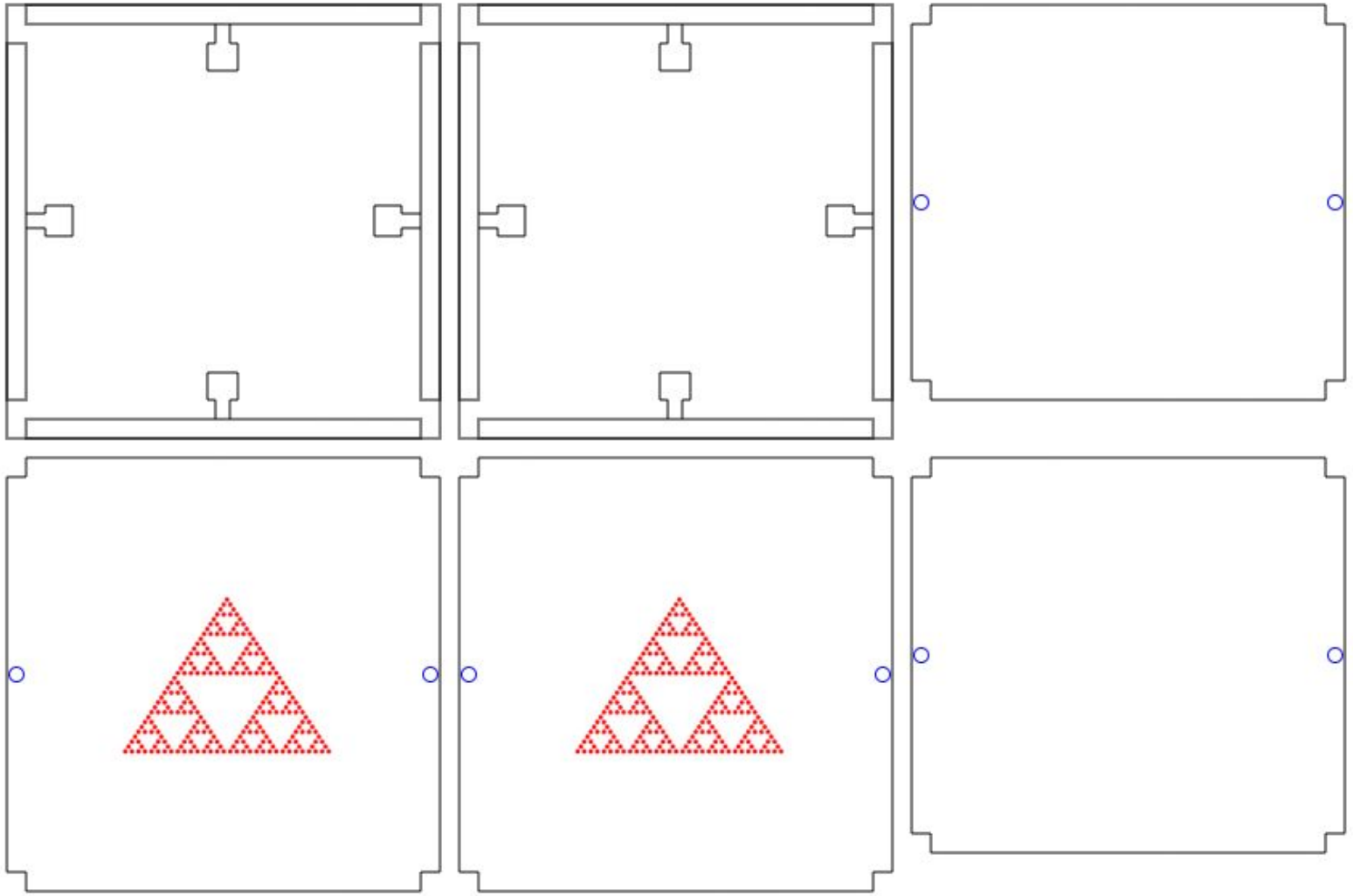


Example 4 showing Input Parameters & Output Flat Patterns

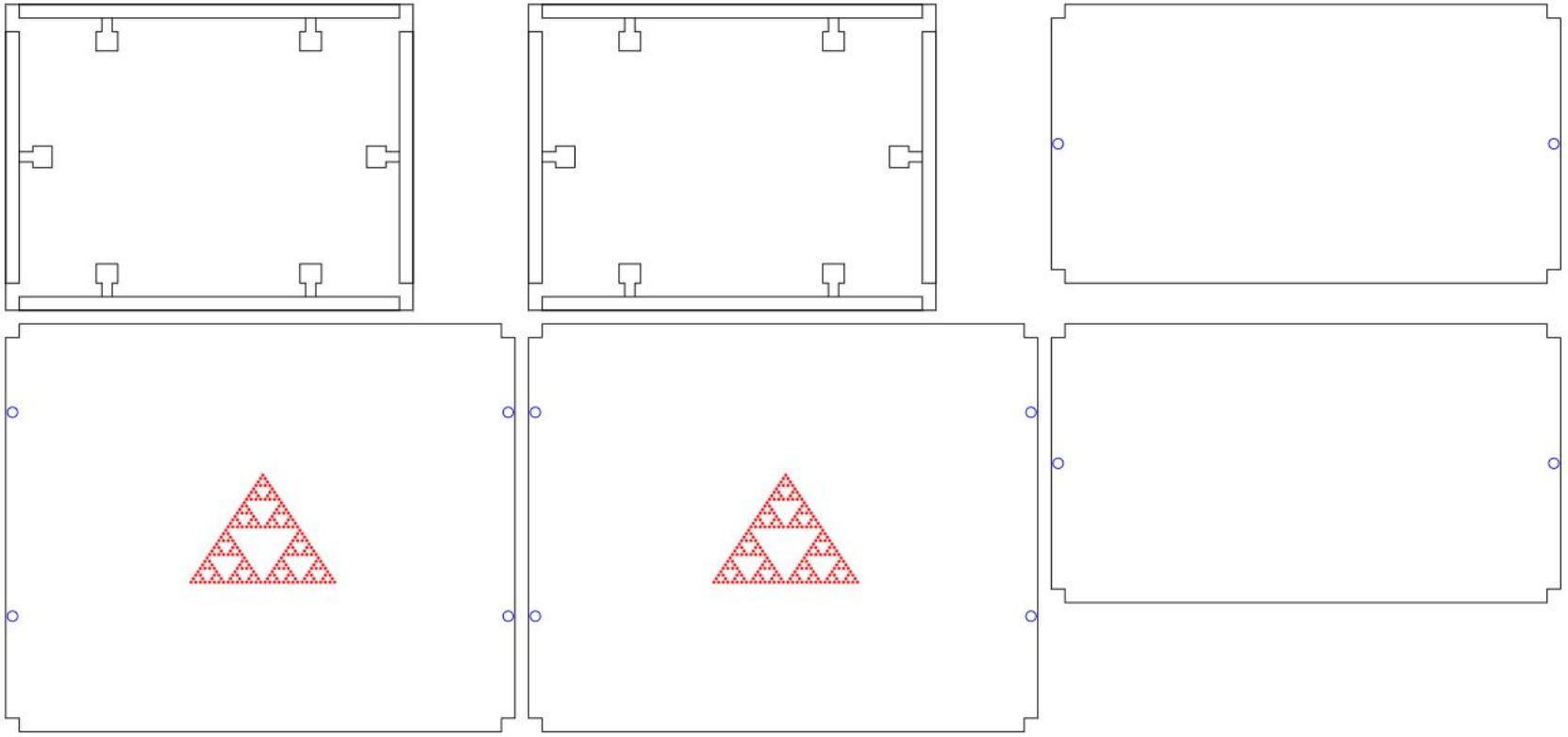
```
Enter the desired height of your box to the nearest whole inch (maximum 5 inches): 4
Enter the desired width of your box to the nearest whole inch (maximum 5 inches): 5
Enter the desired length of your box to the nearest whole inch (maximum 5 inches): 2
```



SVG layout and physical box (3in x 3in x 3in)



SVG layout and physical box (5in x 4in x 3in)



ED Discussion Post

Laser Cut Box Images -dd2950 & ncp2136 #39

D Daniela Duron Garcia
15 hours ago in Laser Cut Box

STAR WATCH 33 VIEWS

Hi! Here are the boxes Nico and I made.

References

- Fractal: https://courses.cs.washington.edu/courses/cse142/01sp/misc/fractal_lab.htm
- Chat GPT for debugging: https://chat.openai.com/

Appendix

- Link to final code: https://docs.google.com/document/d/1dSsIi1Ddok1AwRvf4WVIhNQFi4HBccXpzJd9P5PtNAQ/edit?usp=sharing