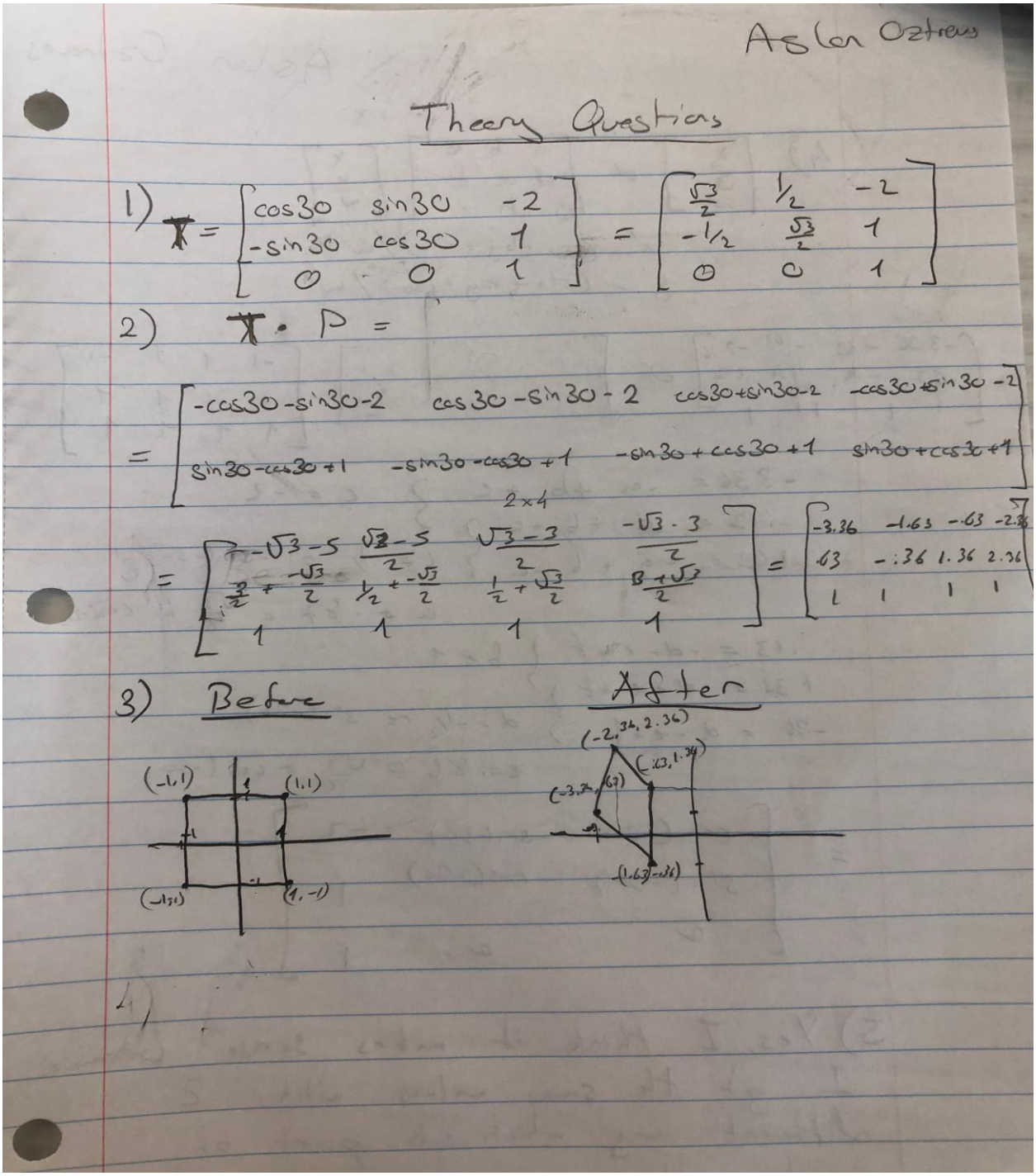
Aslan Oztreves

CS 435

Matthew Burlick

Homework #5

Theory



Aslan Ozhraes

4) $\begin{bmatrix} x' \\ y' \\ w' \end{bmatrix} \propto \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix} \begin{bmatrix} x \\ y \\ w \end{bmatrix}$

$x' = (ax + by + cw)/w'$

$y' = (dx + ey + fw)/w'$

$\begin{bmatrix} -3.36 & -1.63 & -.63 & -2.36 \\ .63 & -1 & 1.36 & 2.36 \\ 1 & 1 & 1 & 1 \end{bmatrix} \propto \begin{bmatrix} ? & ? & ? \\ ? & ? & ? \\ ? & ? & ? \end{bmatrix} \begin{bmatrix} -1 & 1 & 1 & -1 \\ -1 & -1 & 1 & 1 \\ 1 & 1 & -1 & 1 \end{bmatrix}$

$-3.36 = -a + b + c$
$-.63 = a + b + c$
$-1.63 = -a + b + c$
$\Big\} \quad c = -2$

$b = 1/2 = -\sin(-30)$

$a = .87 = \frac{\sqrt{3}}{2} \sim \cos(-30)$

$.13 = -d - e + f$
$1.31 = d + e + f$
$-.36 = d - e + f$
$\Big\} \quad f = 1$

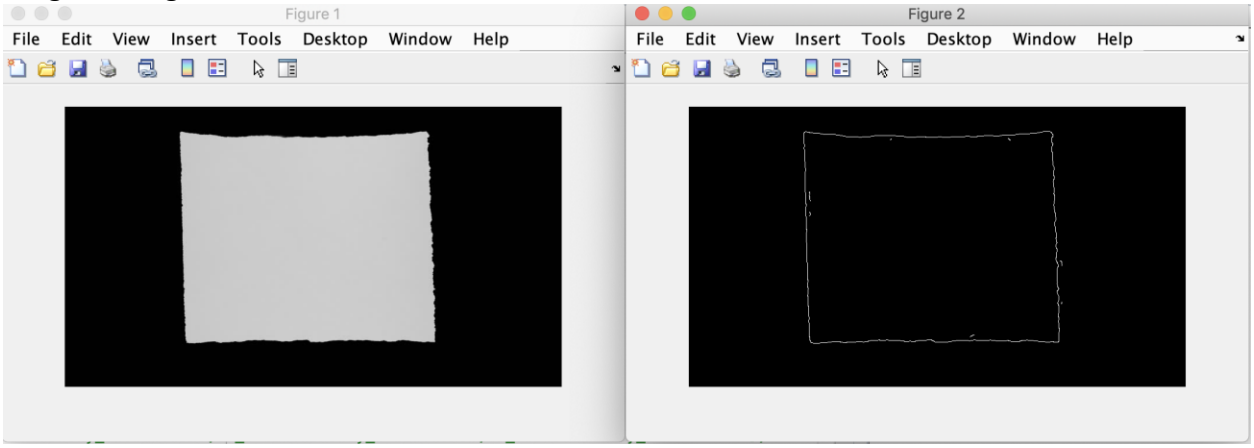
$d = -1/2 \simeq \sin(-30)$

$e = .86 \simeq \frac{\sqrt{3}}{2} = \cos(-30$

$= \begin{bmatrix} \cos(-30 & -\sin(-30) & -2 \\ \sin(-30) & \cos(-30) & 1 \\ a & a & 1 \end{bmatrix}$

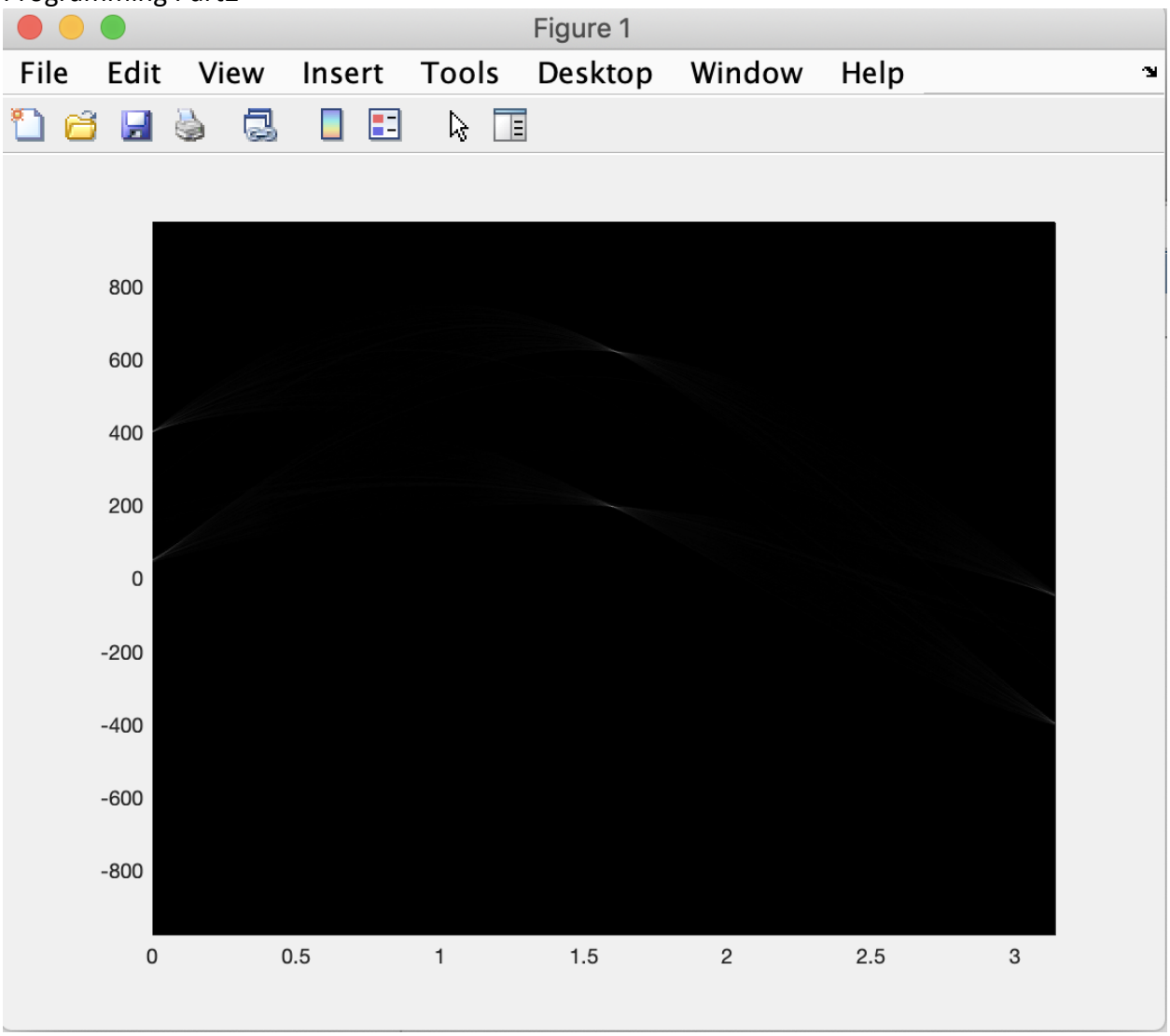
5) Yes, I think it makes sense because I got the same values with 2 different way which is proof of each other.

Programming Part1

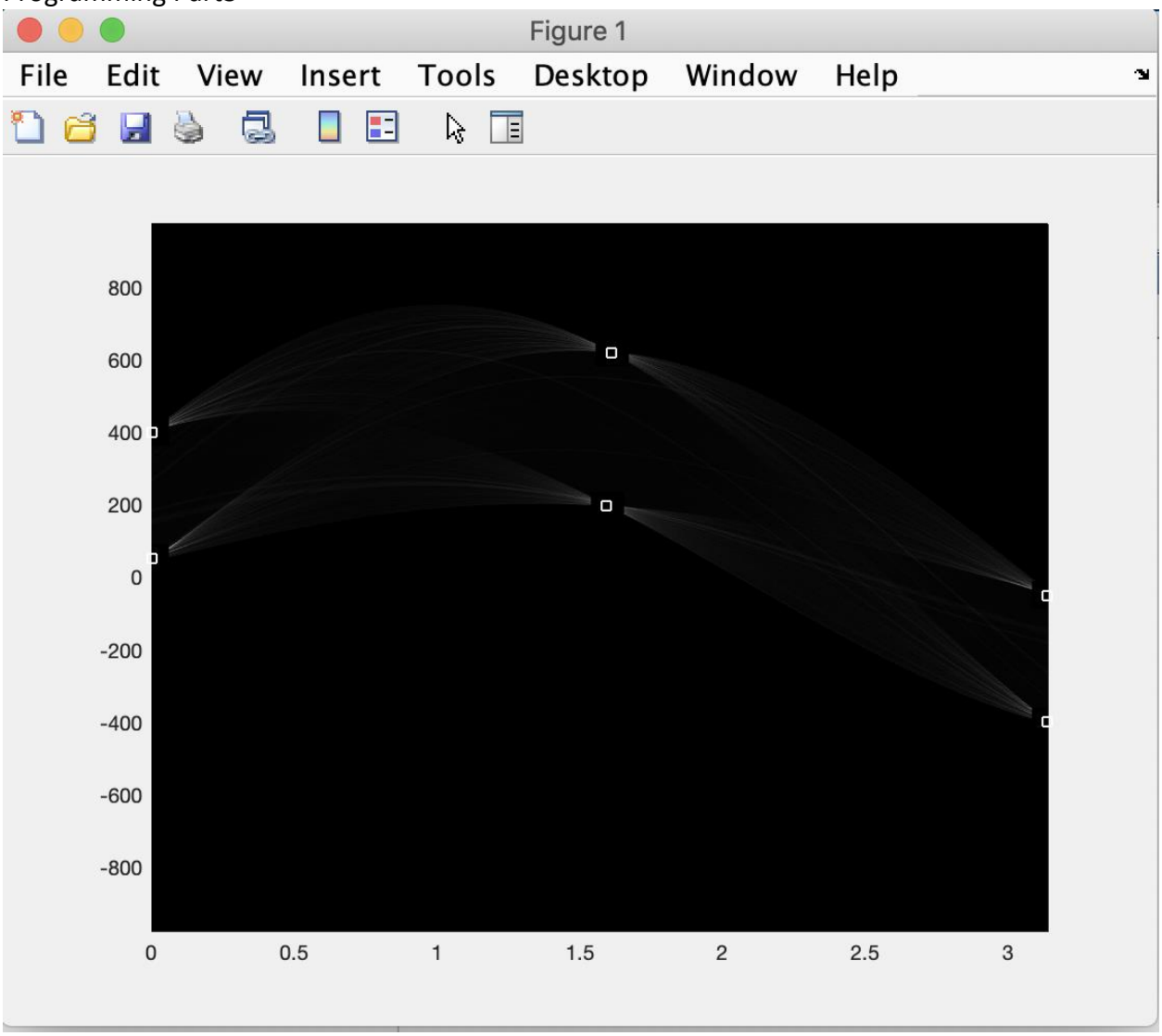


Original image on the left, edged image on the right.

Programming Part2



Programming Part3

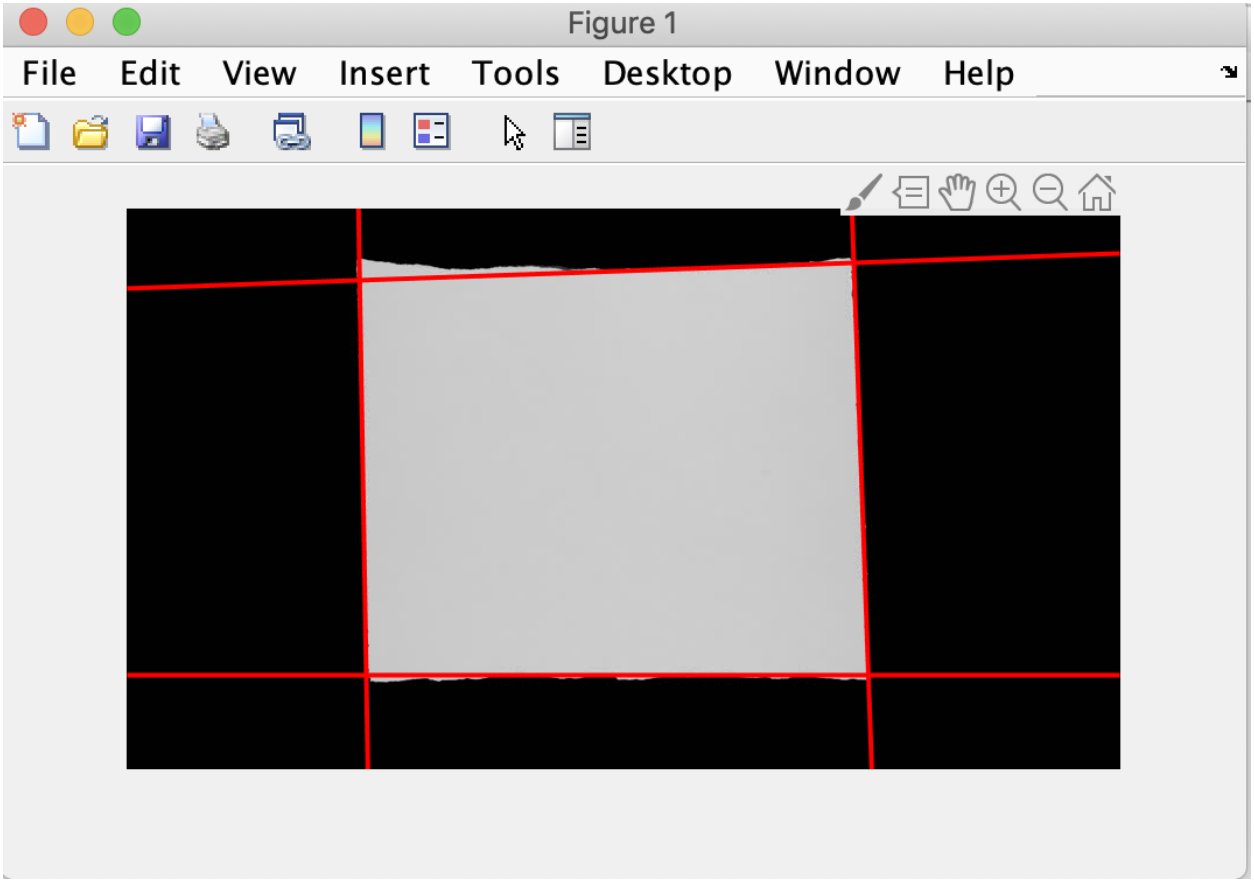


I have found the peaks by sorting my histogram so that I can find the highest values, then I compare that to the threshold, so I don't have a lot of peaks only the ones higher. Then I have clustered my points from histogram to lowx, lowy, highx and highy and then used that for my next calculation by changing my histogram accordingly.

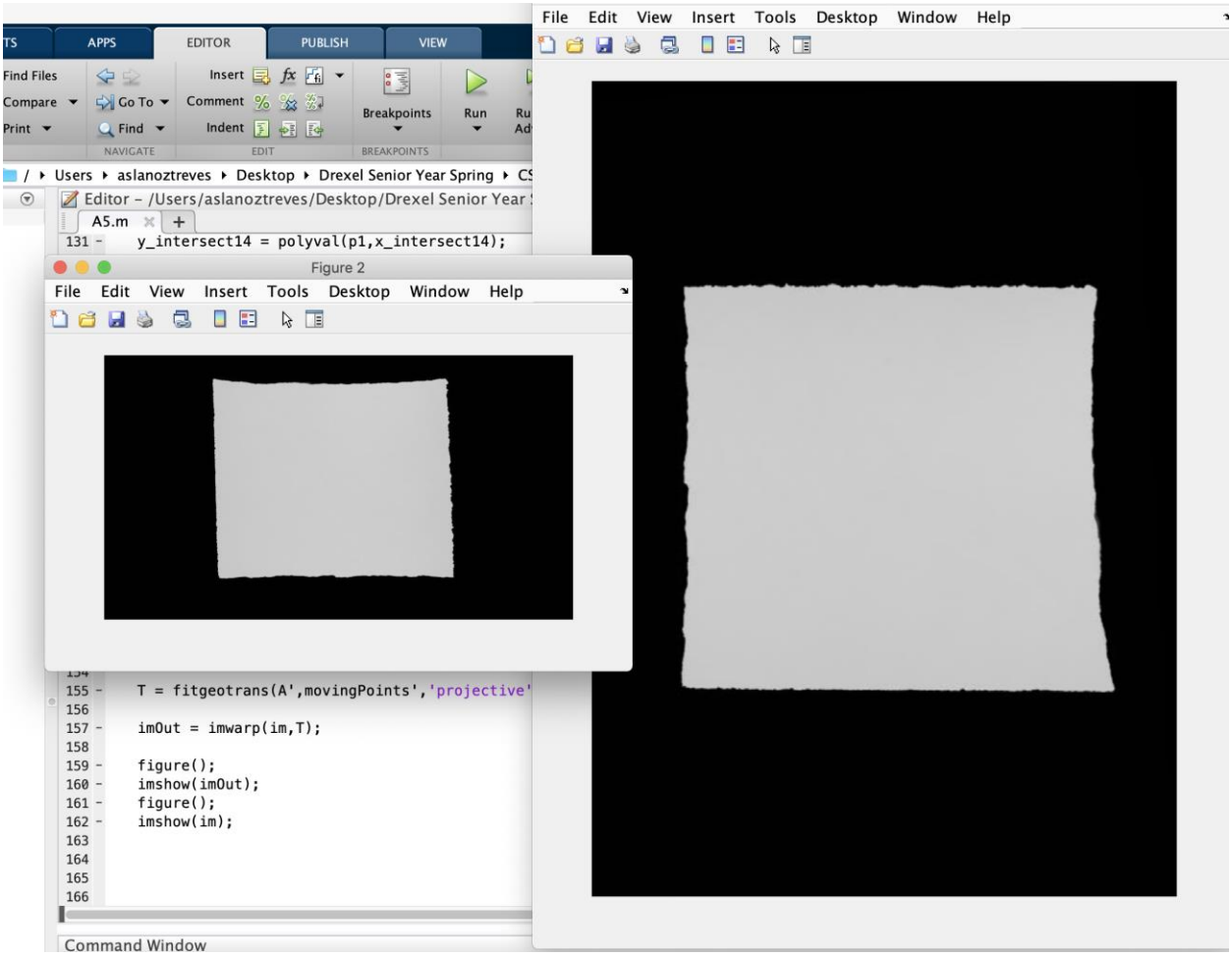
Programming Part 4

I have used the formulas such as these to find the points in lines. Then saved all the points then extracted the intersection points to find the corners of the paper.

```
slope = (y2-y1)/(x2-x1);
yLeft = slope * (xLeft - x1) + y1;
```

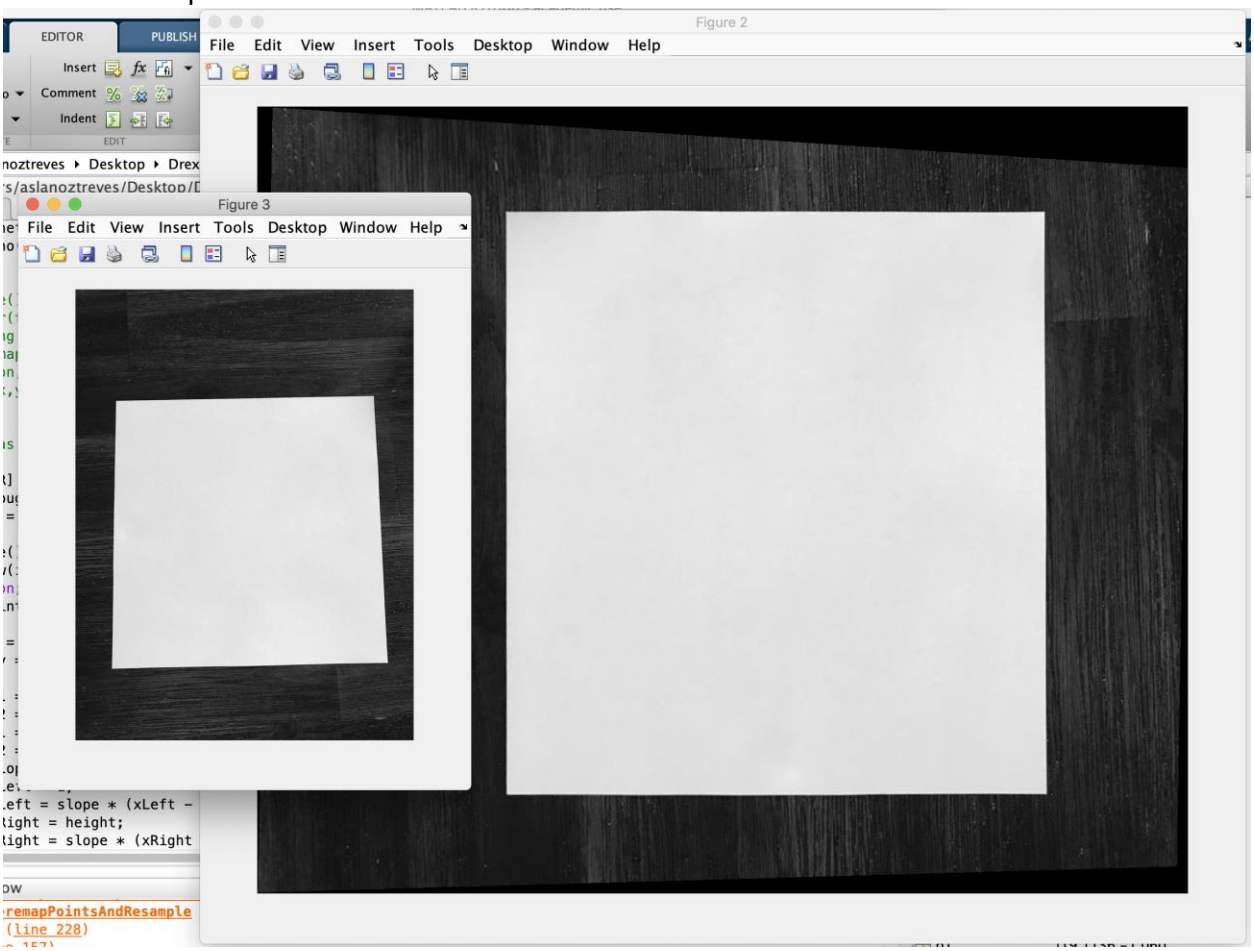


Programming Part 5



I am not sure if this was the right form but everything is automated so I am sure it would work for any picture

Another Example



Thank you!