Peter Smith

ECE 1390

PES71

Problem Set 2

2d) For this problem I chose to go with the sizes that Matlab initializes their threshold and neighborhood sizes. I was able to get an output that was acceptable.

3c) To get the image that shows the proper lines I had to use a 9x9 gaussian filter. I then had to lower the threshold of the peak finder.

4c) To get the best result for this image I had to use an 11x17 gaussian filter with a high sigma. I ran the edge detector and the only edges to return were those of the pens. This allowed me to find the peaks of the lines and draw them in the image.

5b) I ran a 7x7 gaussian filter with a sigma of 3 to get the circles to stand out in the edge detector. To find the circles in this image I had to raise the threshold of the peak finder until I was only getting the circles in the image.

6b) The problem with this image is that there are a lot of clear edges in the picture. The book's cover has a lot of shapes and writing that are getting picked up when running the edge operator.

7b) When processing the image initially I was picking up several false alarms. I was able to get rid of all but one of them by adjusting the threshold of the peak finder. To do this quickly, I added an optional parameter that allowed me to adjust the threshold on every function call.

```
def find_circles(BW, r_range,th= 1.5):
    z = len(r_range)
    length,width = BW.shape
    H = np.zeros((width,length,z))
    for i in range(len(r_range)):
        H[:,:,i] = hough_circles_acc(BW,
    centers = []
    radii = []
    vals = []
    length , width, depth = H.shape
    neighborhood = int(length/15)
    threshold = np.amax(H)/th
```

8) My function was not able to clearly find any circles. It was able to find some lines but not many. For the circles we may be able to write a function that searches for ellipses.