Problem set 1

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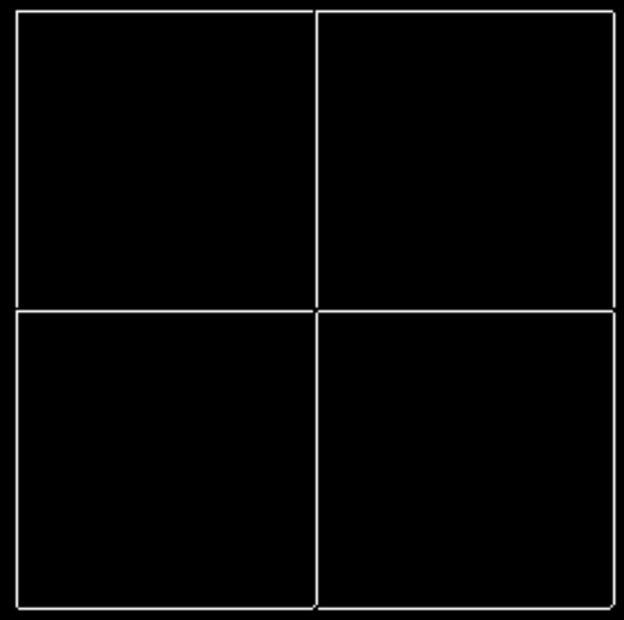
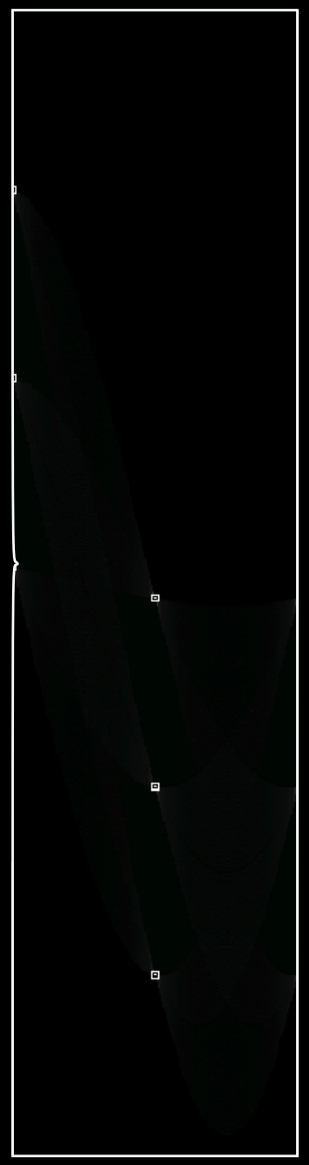
Notes

- Sections were run independently in the IDE
- Images presented here are not actual size

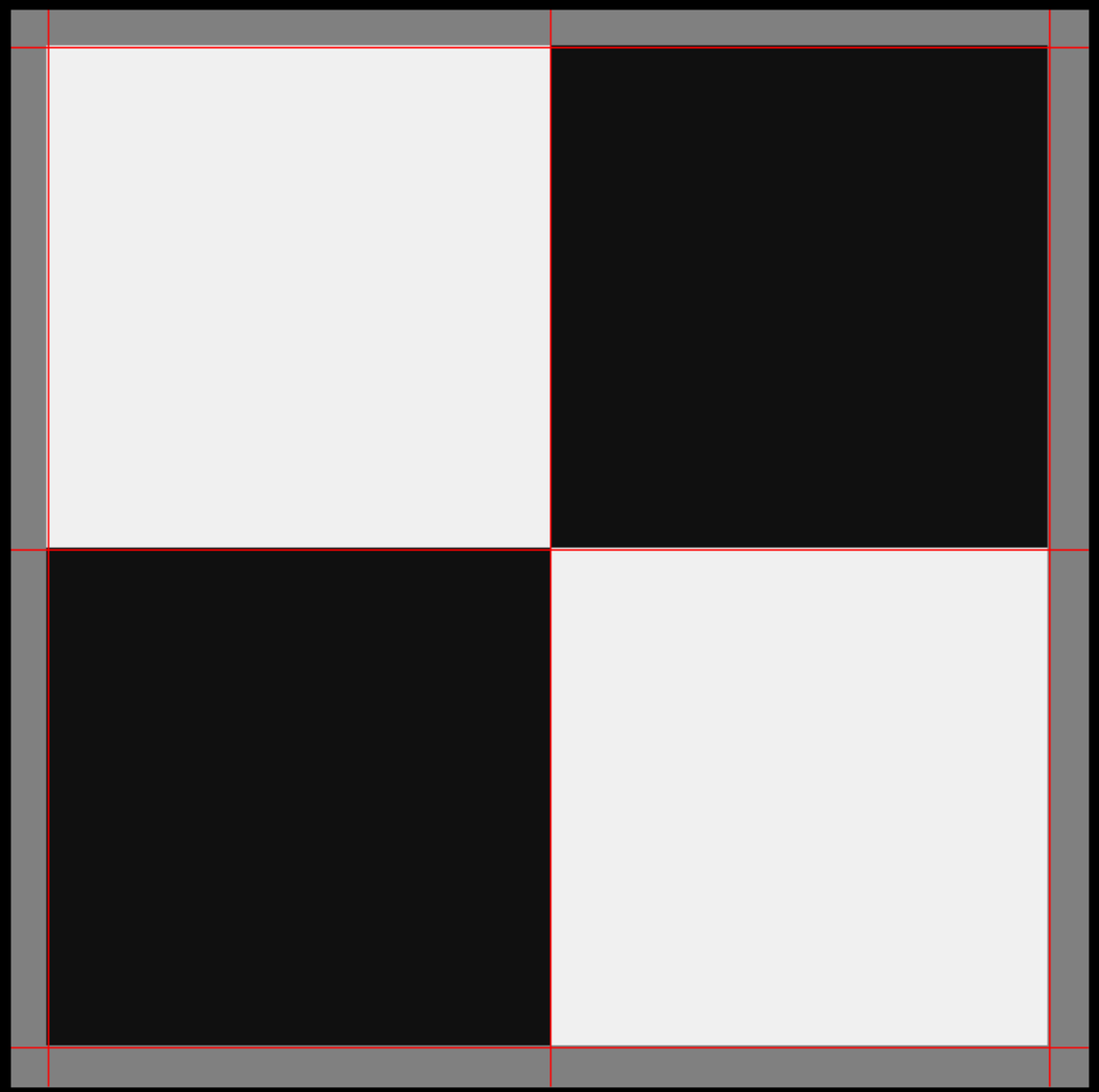


1-a-1

2-a-1

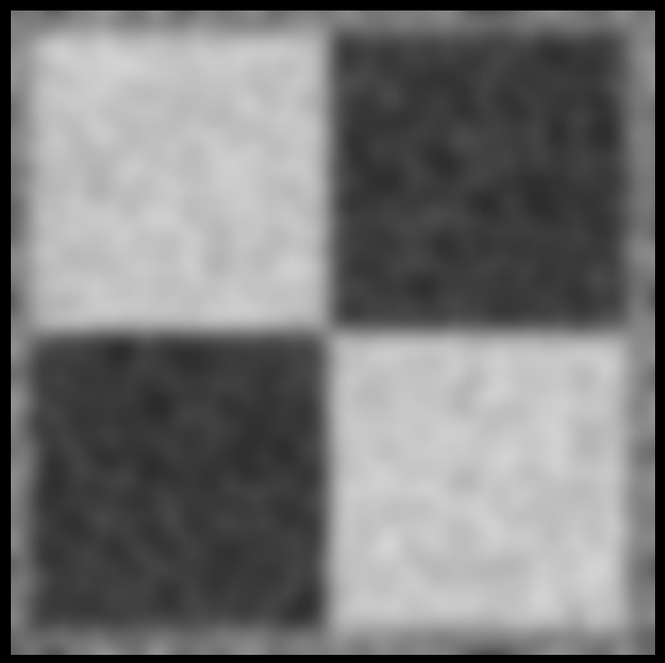


2-b-1

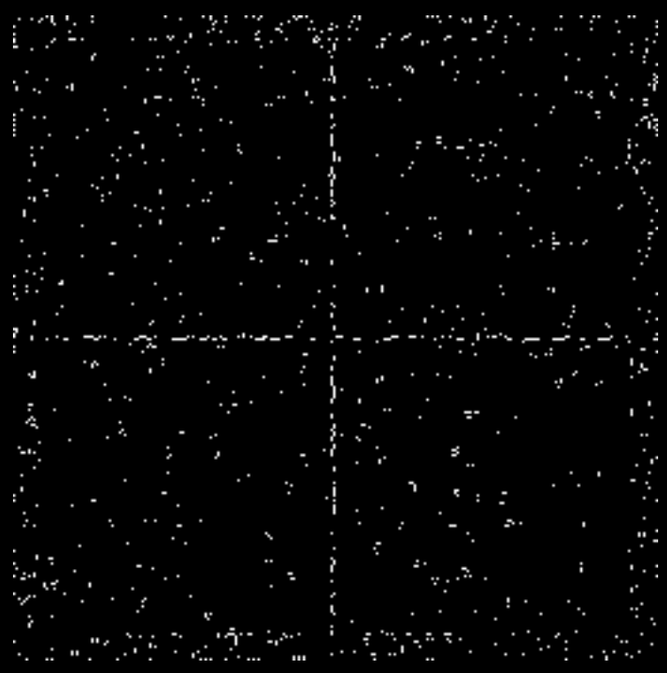


2-c-1

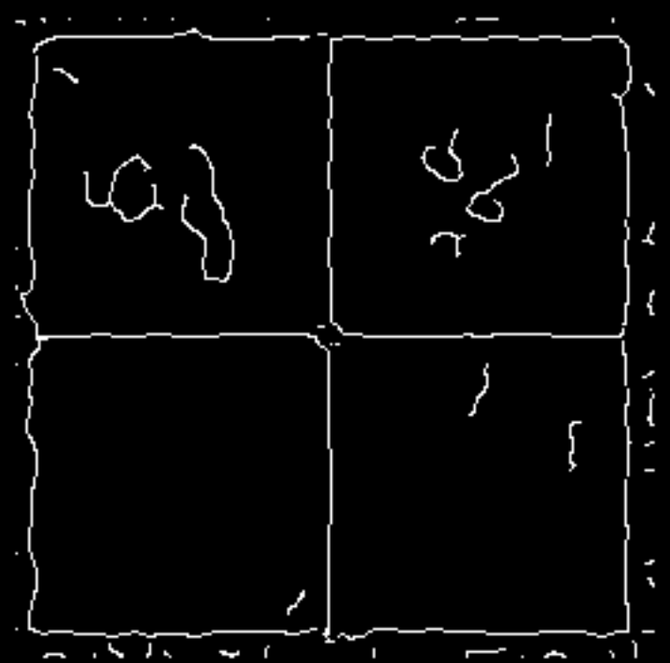
All threshold values were default, and bin size was 1.
This proved sufficient for this image.



3-a-1



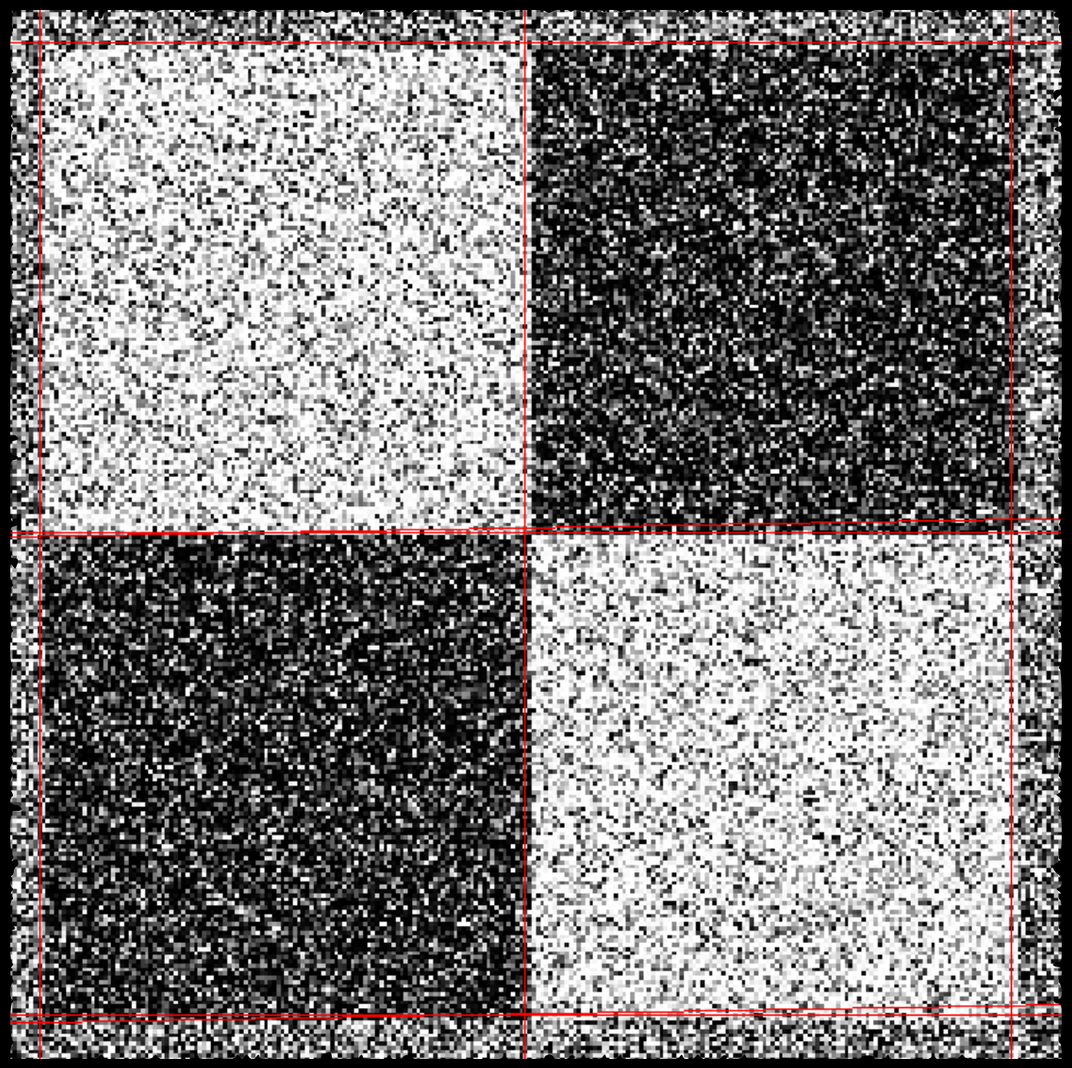
3-b-1



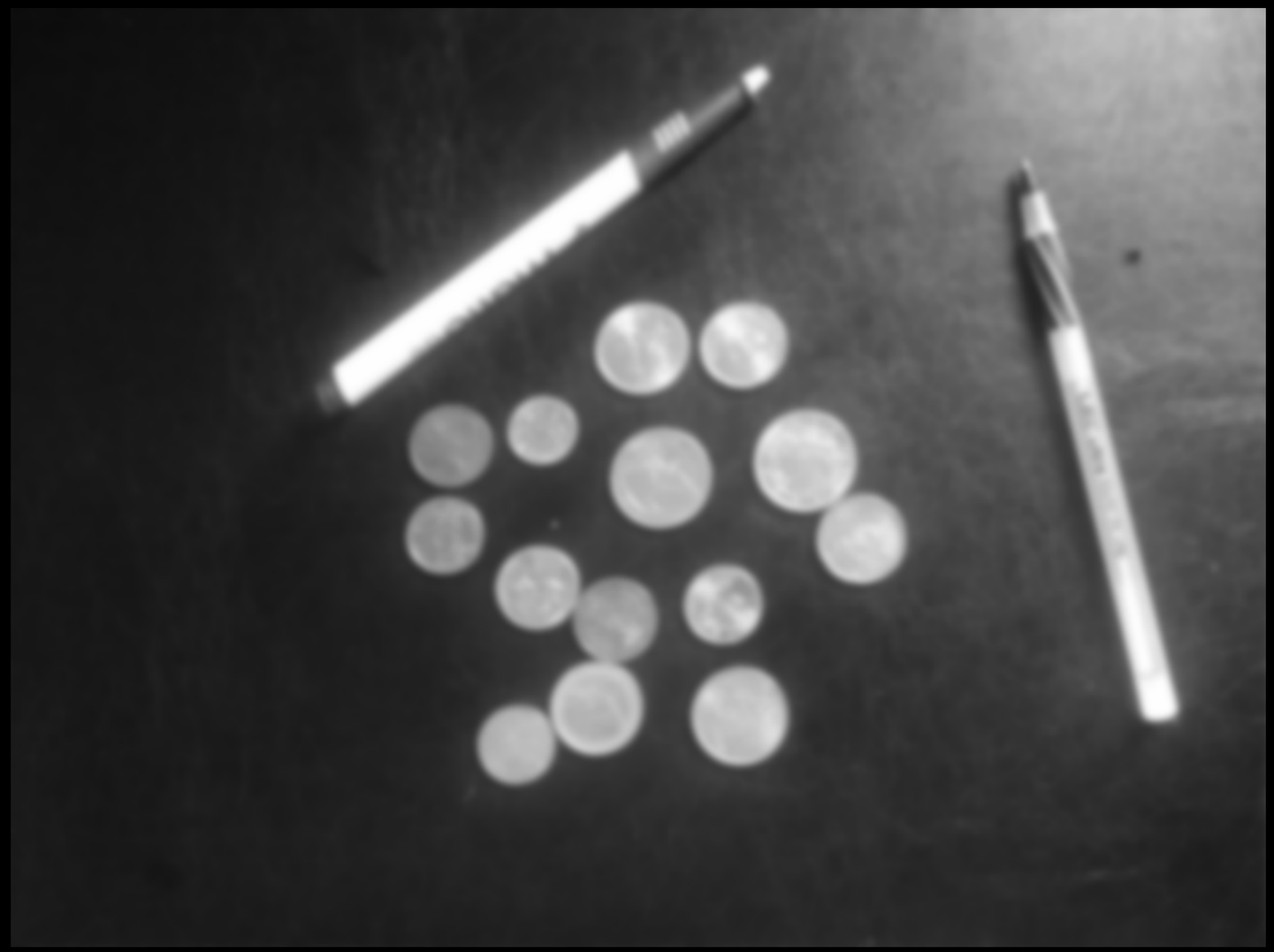
3-b-2

3-c-1

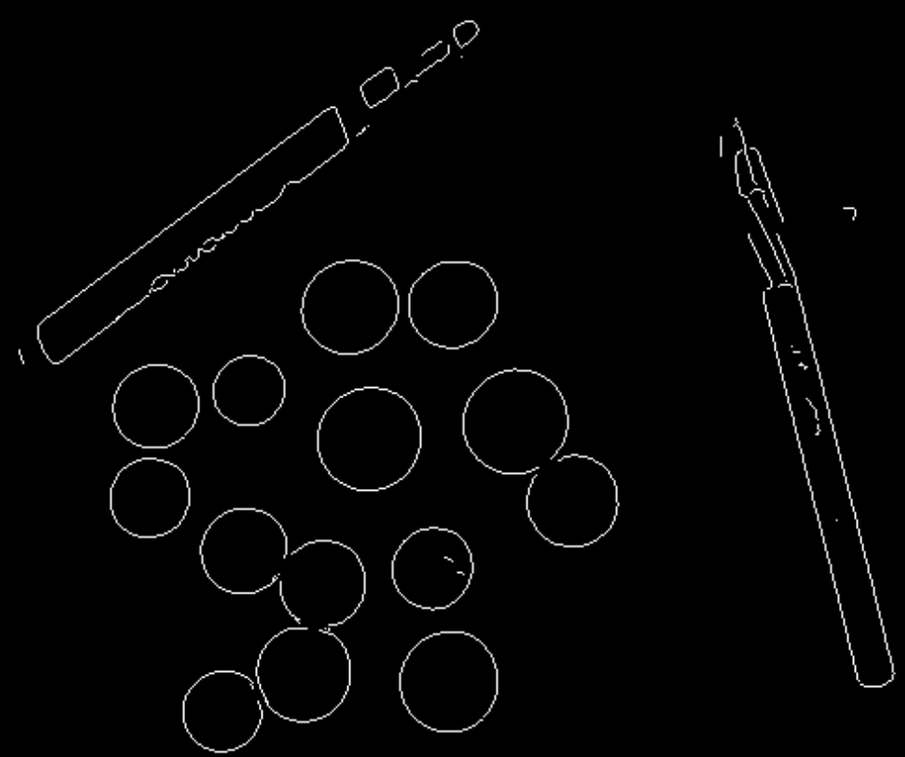
The key requirement to get good lines was a light smoothing and use of canny edge detection.



3-c-2



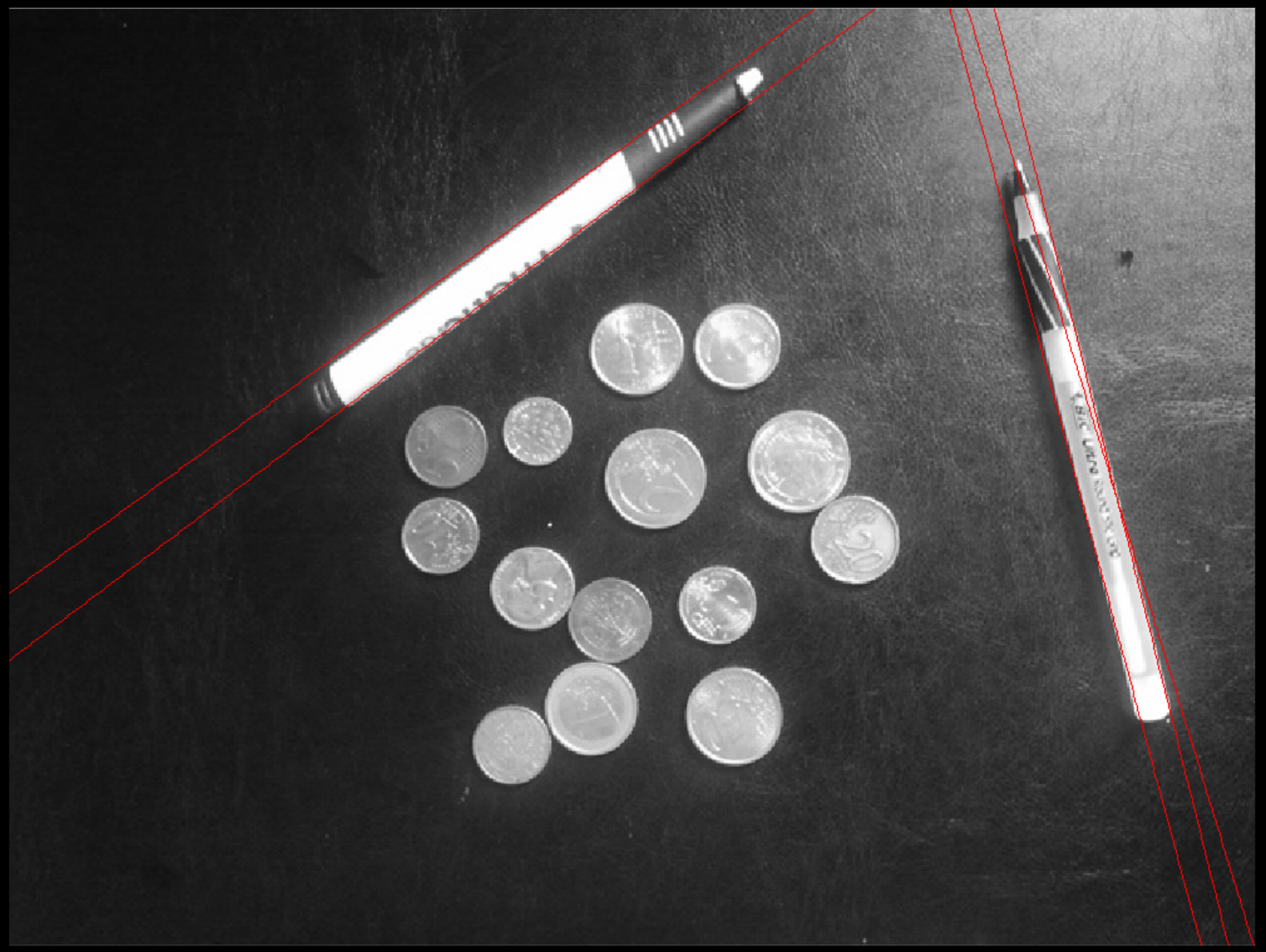
4-a-1



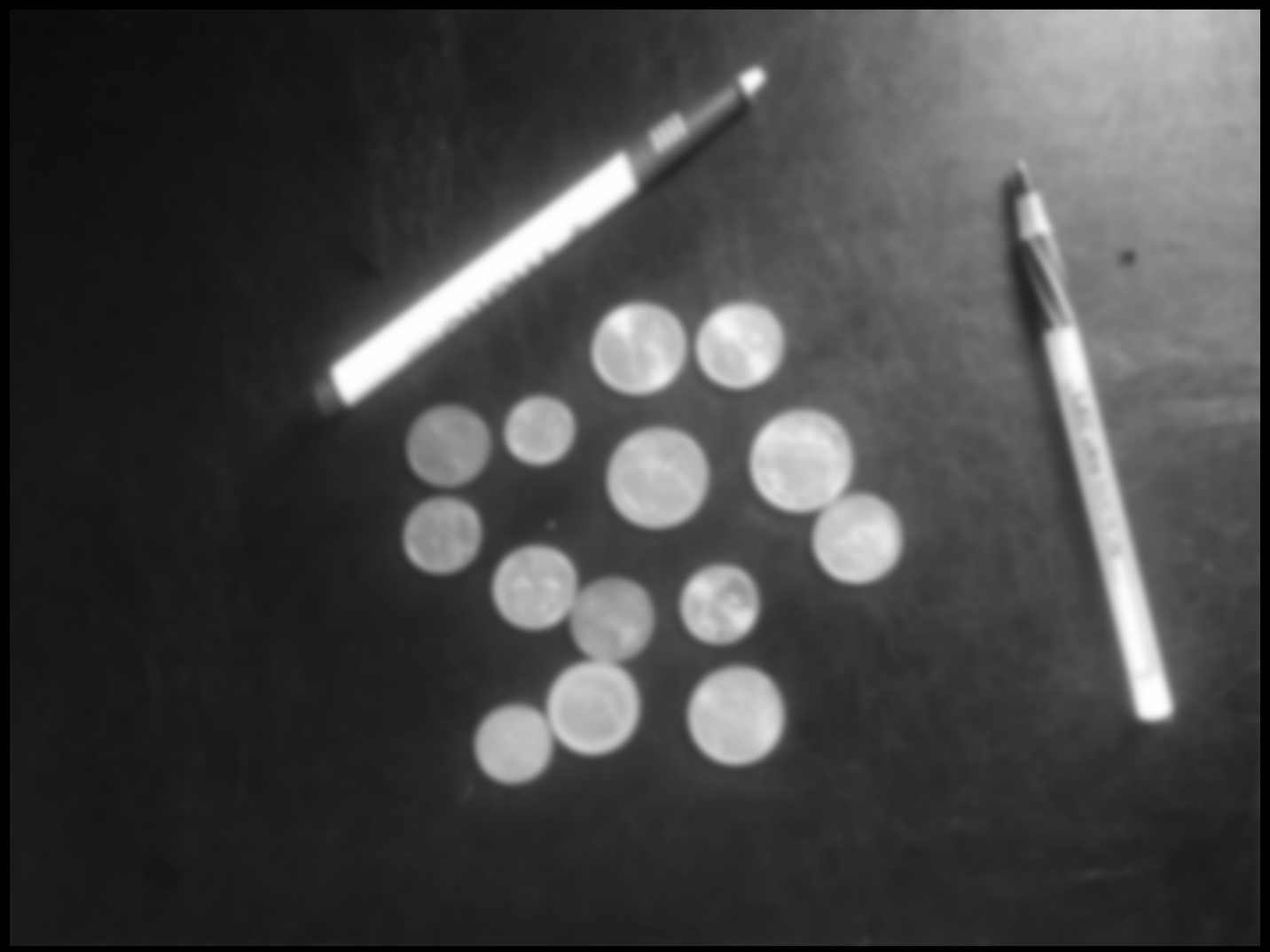
4-b-1

4-c-1

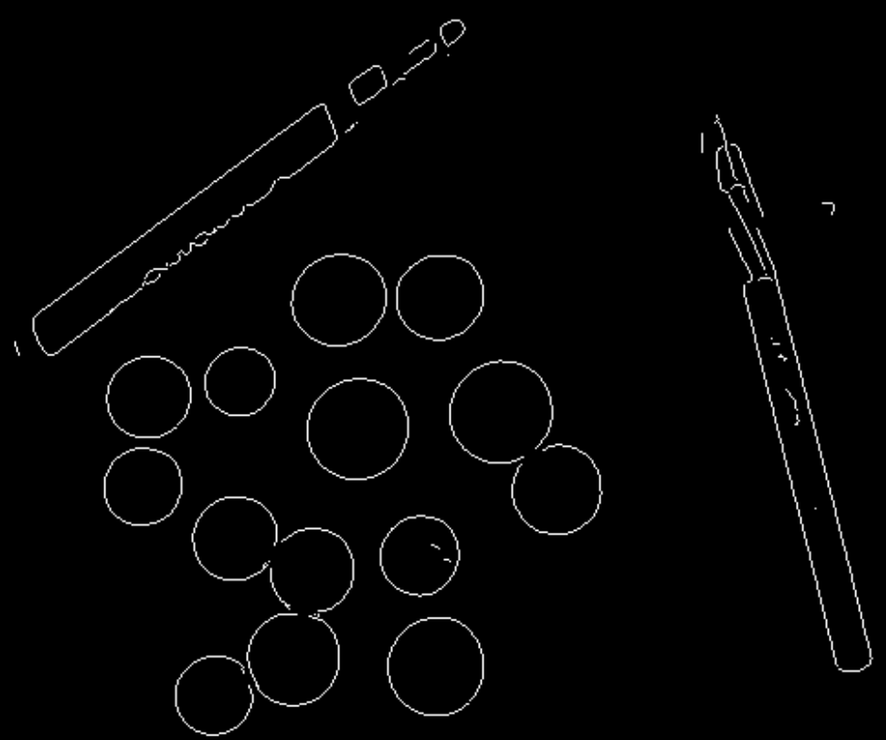
Results here required significant experimentation with the Gaussian filter size.



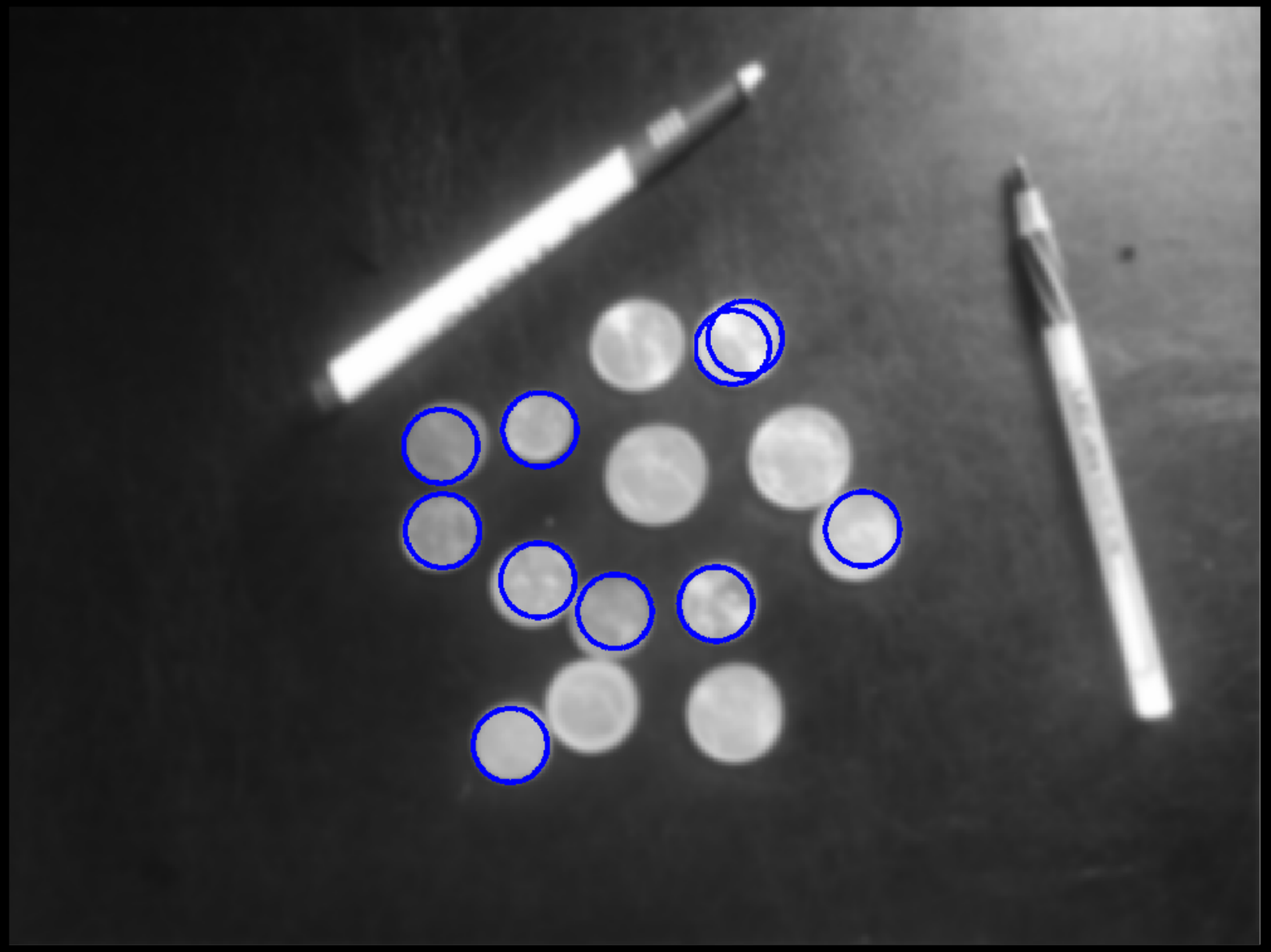
4-c-2



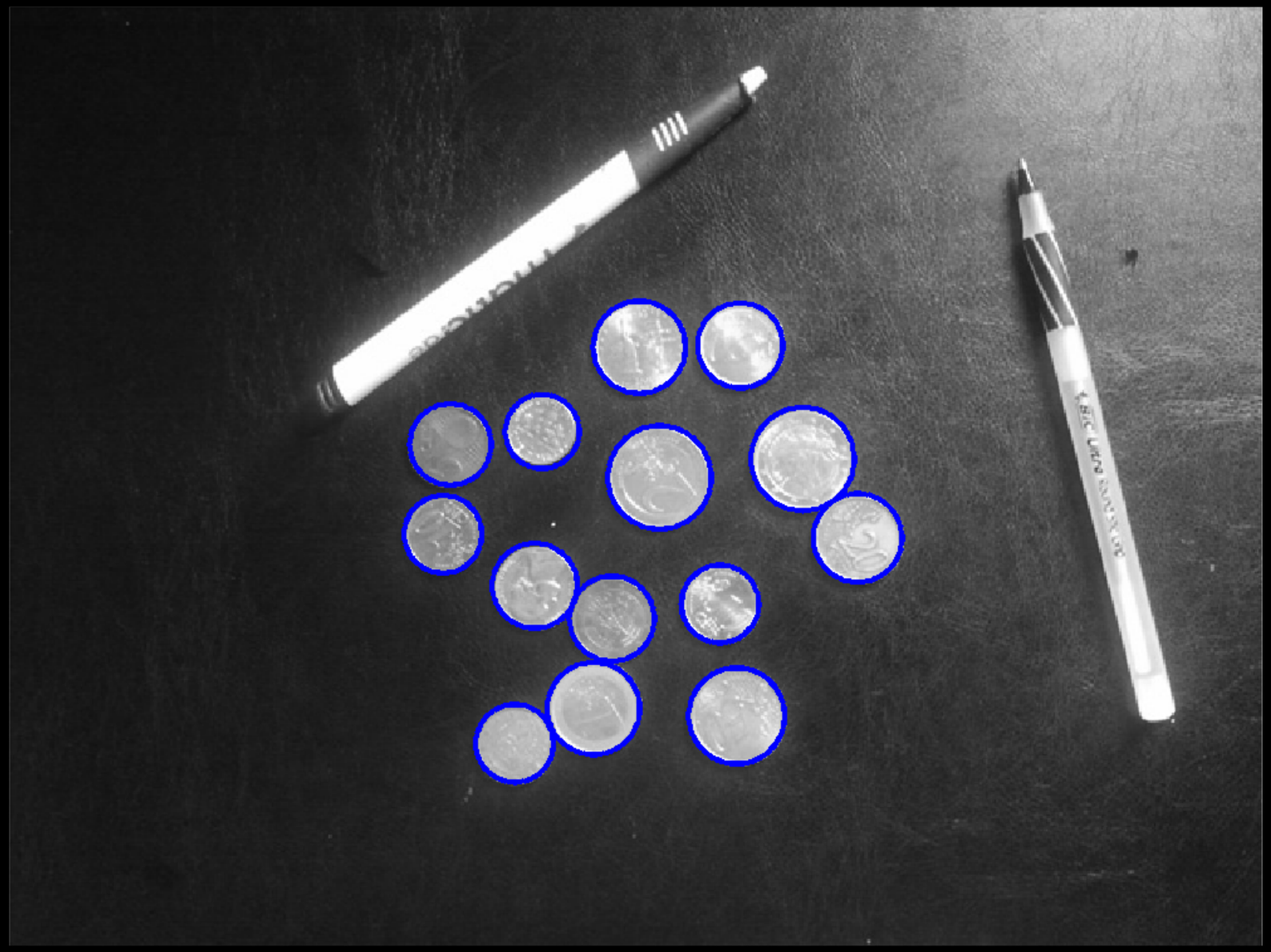
5-a-1



5-a-2



5-a-3



5-b-1

A 3d array was created as described in class calculating the cones of possible centers. Additionally the centers were found using all points in the matrix. Removal of surrounding candidate solutions was critical to prevent multiple circles per location.

6-a-9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6-b

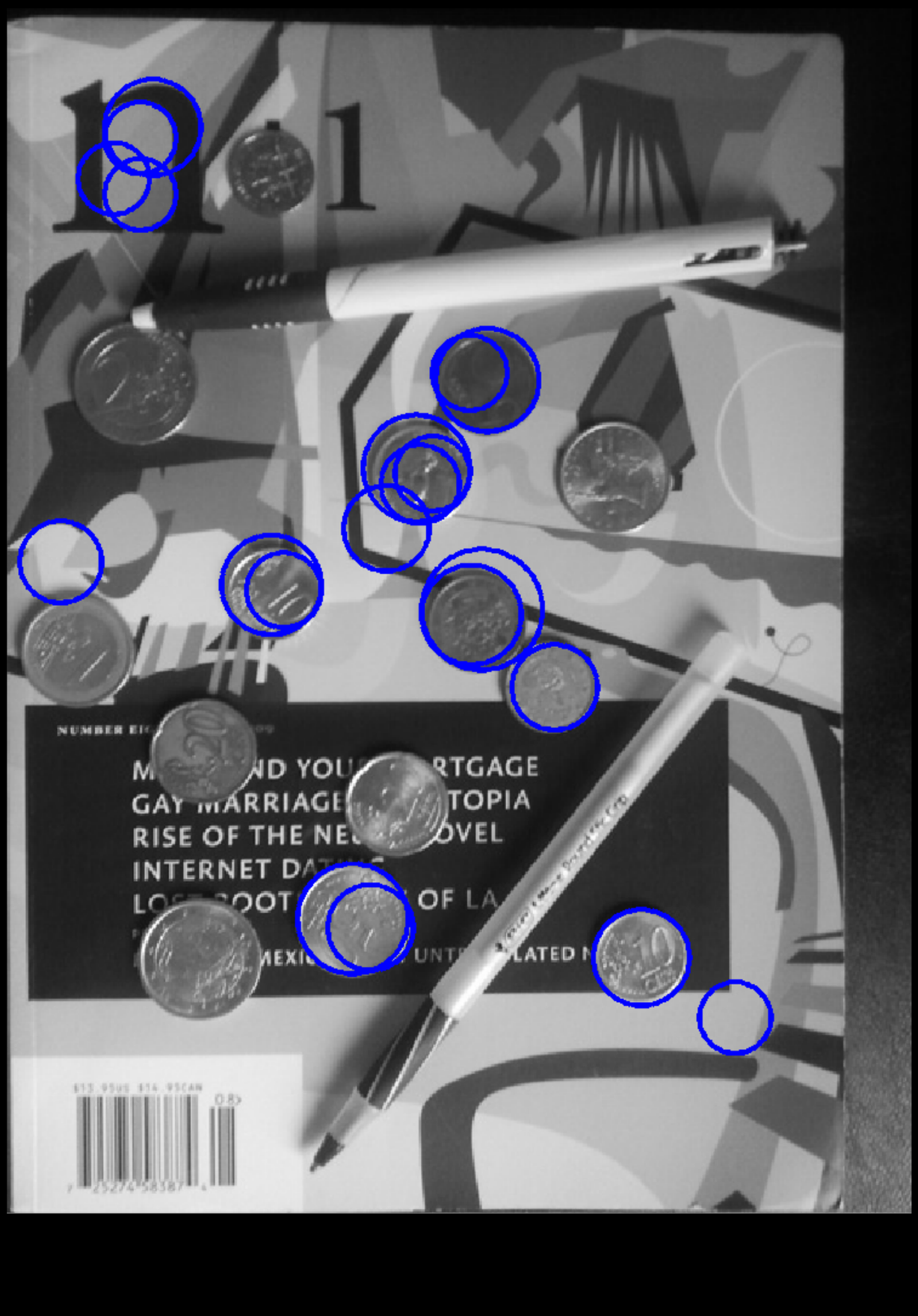
- The main problem is that there are multiple reasons for an edge to appear in the image. First, there are many objects, including the book, creating an edge. There are also color based edges on the book from the illustration on the cover.

- This makes it harder to determine if the line is part of the object being looked for (pen) or some other object or the illustration.

6-c

- unable to complete in time :(

1-a-7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7-b

- There are a number of false positive circles found where there are curves with a large difference in intensity (black lettering on light background). Additionally there are some false negatives as well where the circle was not found where it should have been.

8-a-1

Really broken

8-b

- My version of this problem seems to be significantly broken with no circles identified. There is likely a major bug here.
- However I anticipate that the coins being elliptical in nature due to perspective will throw off the Hough algorithm. Knowing ahead of time that it is skewed it is possible to search for ellipses instead, however this is expensive. Another would be to look for circles with courser bin sizes, so that the closest one is found. This would decrease the precision of any truly circular objects however.