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3.c.
I tried a variety of gaussian blur sigmas to find one that appeared the best for detecting edges. Then I tried a range of threshold1 and threshold2 to produce the most consistent edges. With these values the default RhoResolution, ThetaRange, Threshold and NHoodSize and numpeaks=10 gave good results.

4.c.
In order to get good results I had to use a small gaussian blur (2.5). At first it was difficult to determine what was causing difficulties -- the results would only produce one of the lines for each of the pens. It turns out that the rho, theta pairs are pretty close for these parallel lines so all that was really required was to reduce the NHoodSize so that the close parallel lines would be distinguished from each other.

5.b.
Finding circles was a bit more challenging. First I needed to reduce the complexity so that the added radius dimension would not make it too difficult. Since the hough process is a sampling algorithm, I opted to only cover theta range at 20 degree increments. This worked sufficiently well that I was able to go through every radius from 19 to 50 on my 1GHz netbook in reasonable time. Once I tried a range of radii, the dominant radius for a circle assimilates all the bad radii choices meaning that the default peak Threshold and NHoodSize work great!

6.b.
Most of the lines found are legitimate, but most of these lines are background. The distinguishing feature of the pens is that they are parallel and fairly close together. So looping through all pairs I keep a list of lines that are close and parallel.

7.b.
The lettering seems to be the most problematic. More blur might be helpful (but I ran out of time to try). This might help find more legitimate circles because the max threshold and numpeaks would not be cluttered by false positives.

8.b.
Several options might improve the circles:

- use an ellipse formula instead of circle formula
- relaxing the threshold would not help because we already have too many bad hits
- transform the image (this would only work for a single plane)
- add an orientation dimension for yaw and pitch (since a circle is symmetric roll is not needed)

I think the orientation dimension would be the best option.