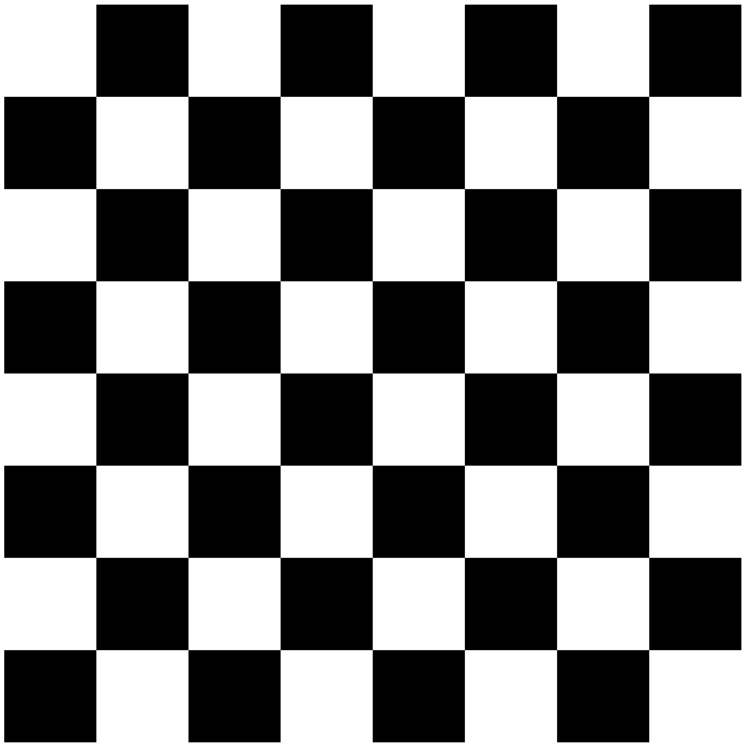
Working with Test Patterns

One way to get a feel for how spatial filters affect an image is to apply them to very simple test patterns. Questions 1 and 2 ask you to apply spatial filters to the following checkerboard pattern, composed of alternating 16-by-16 pixel squares.

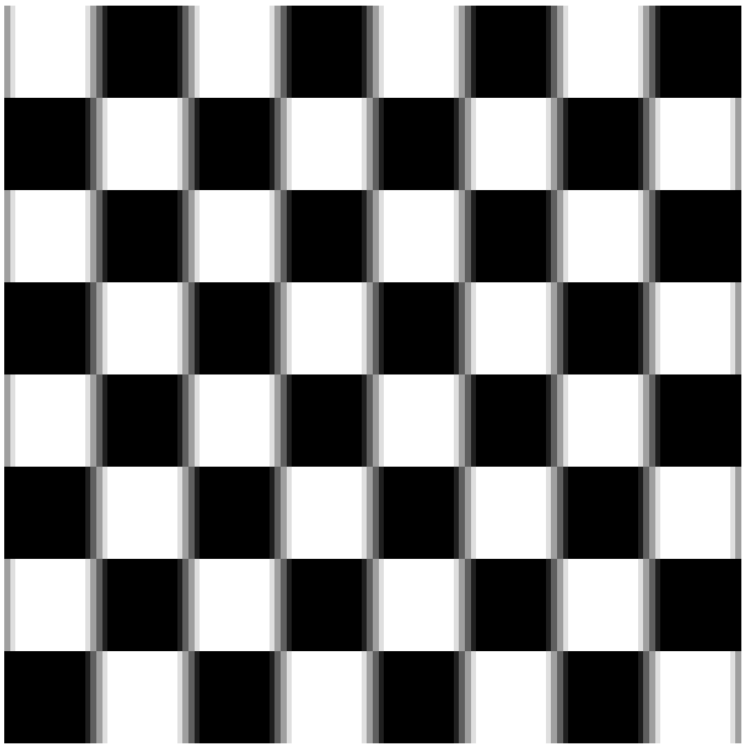


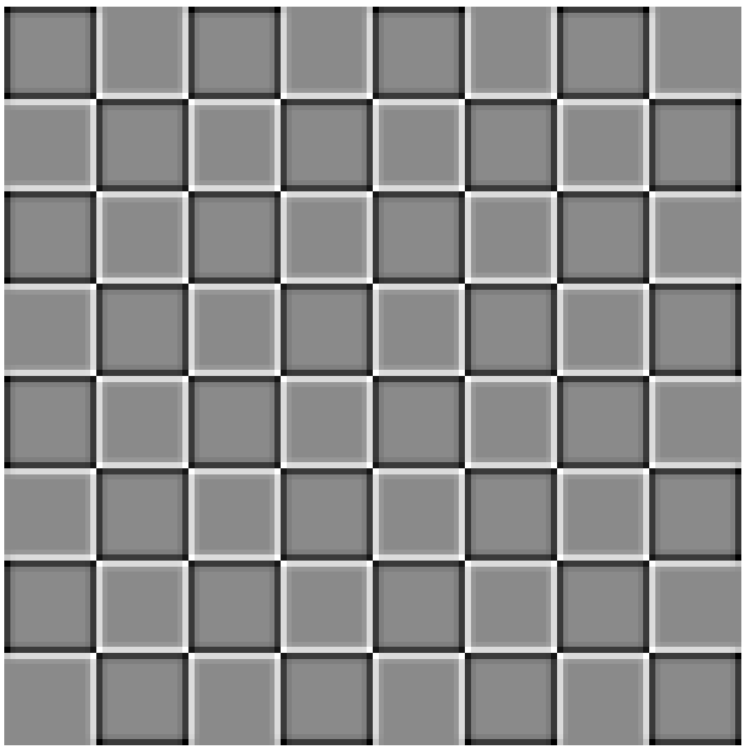
1.

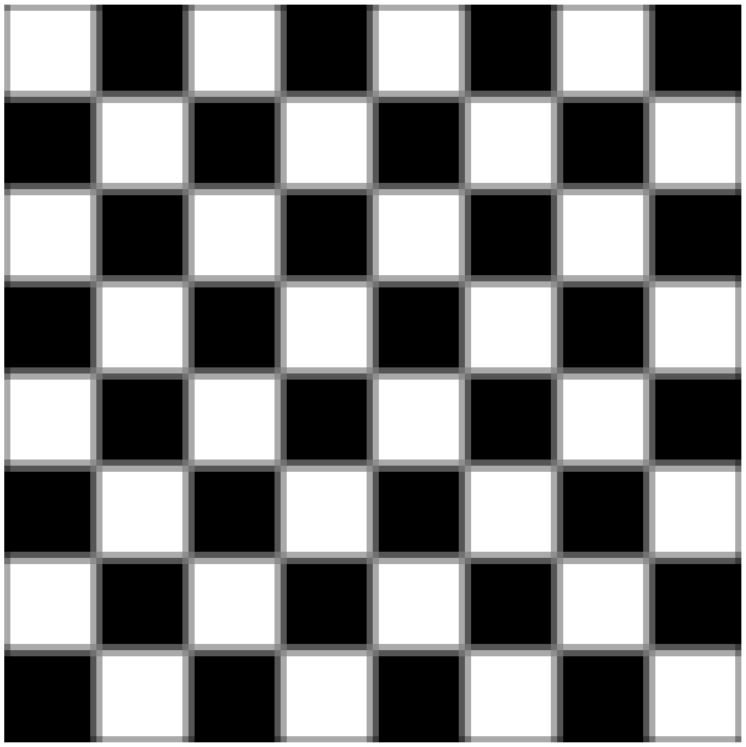
Question 1

Applying Spatial Filters:

Which of the following images is the result of applying a **3x3 averaging filter** to the checkerboard test image (see above)?

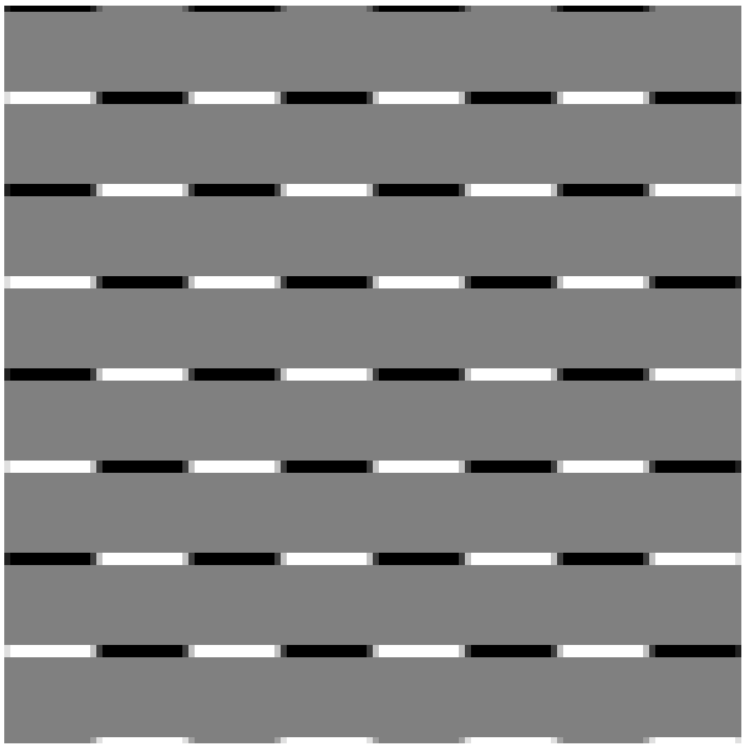






Correct

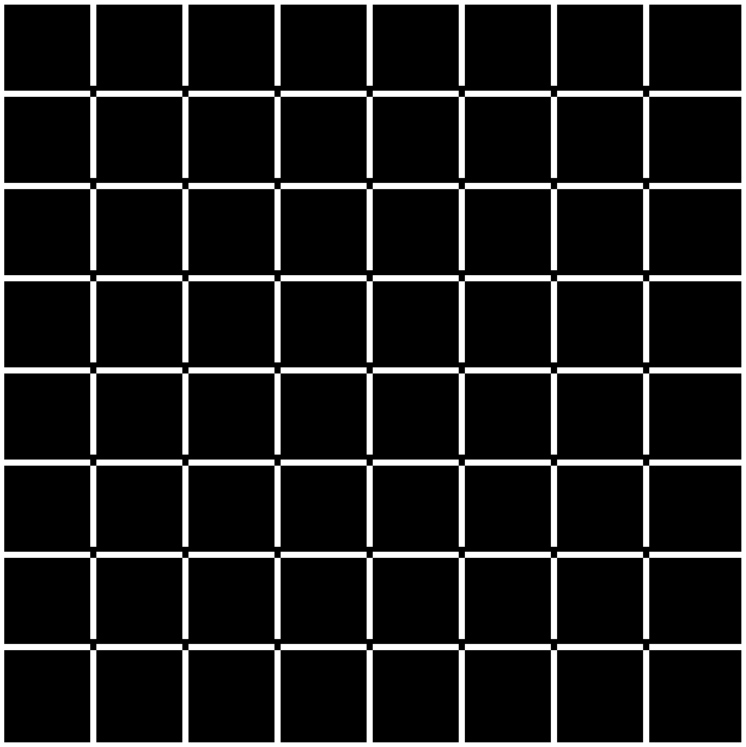
This image was produced with the averaging filter. Note how all of the boundaries between the white and black sections are equally blurred.

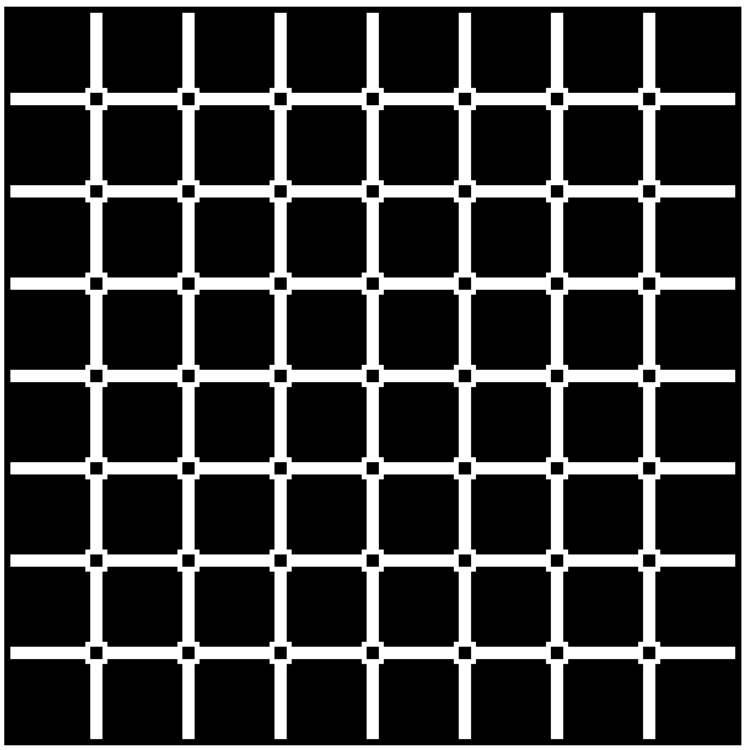


Question 2

Applying Spatial Filters:

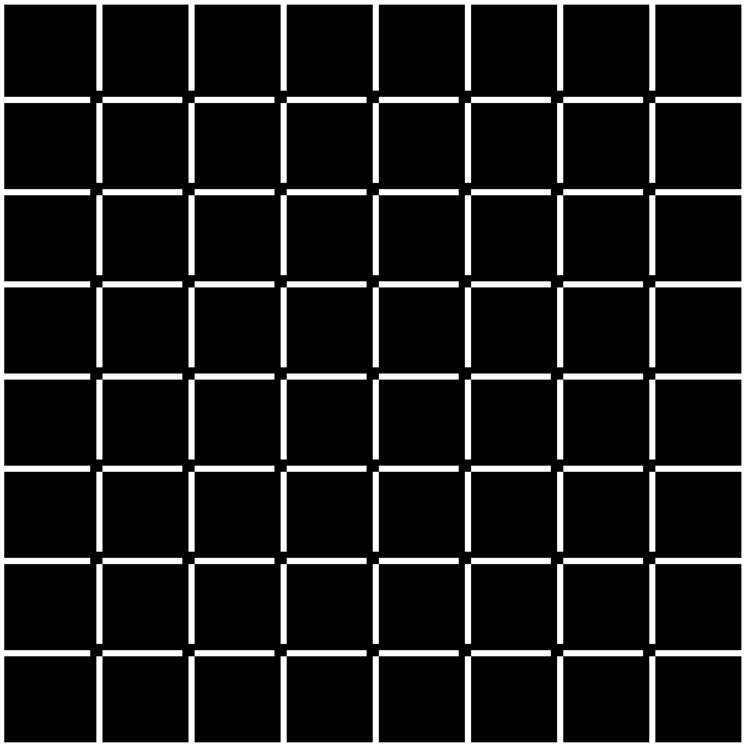
Which of the following images is the result of applying Canny edge detection to the checkerboard test image (see above)?

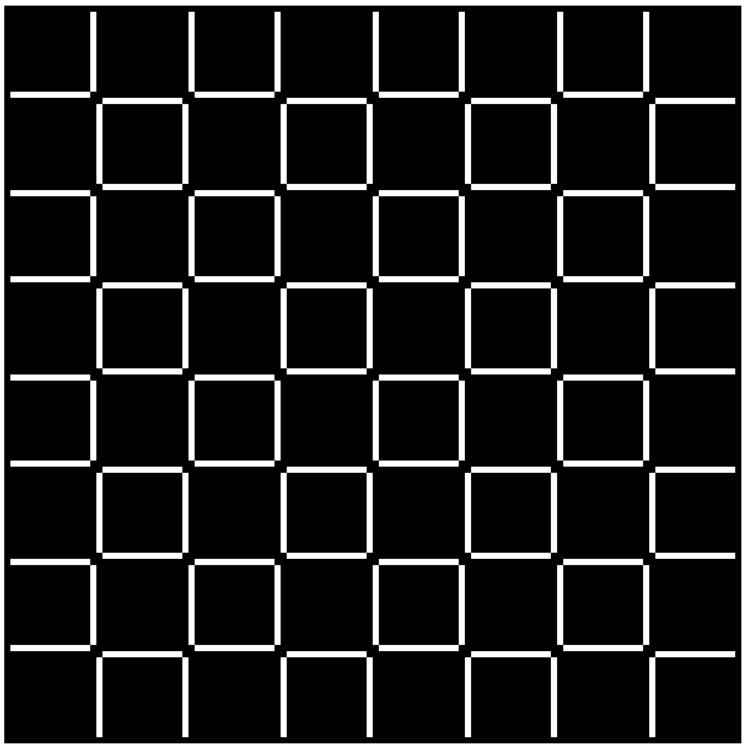




Correct

This is the result of Canny edge detection.

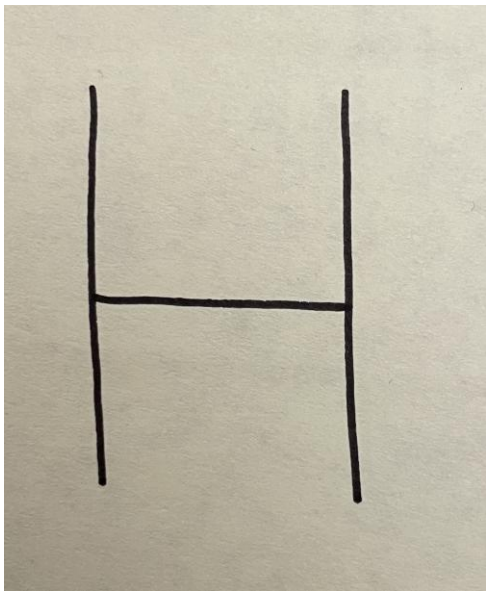




Question 3

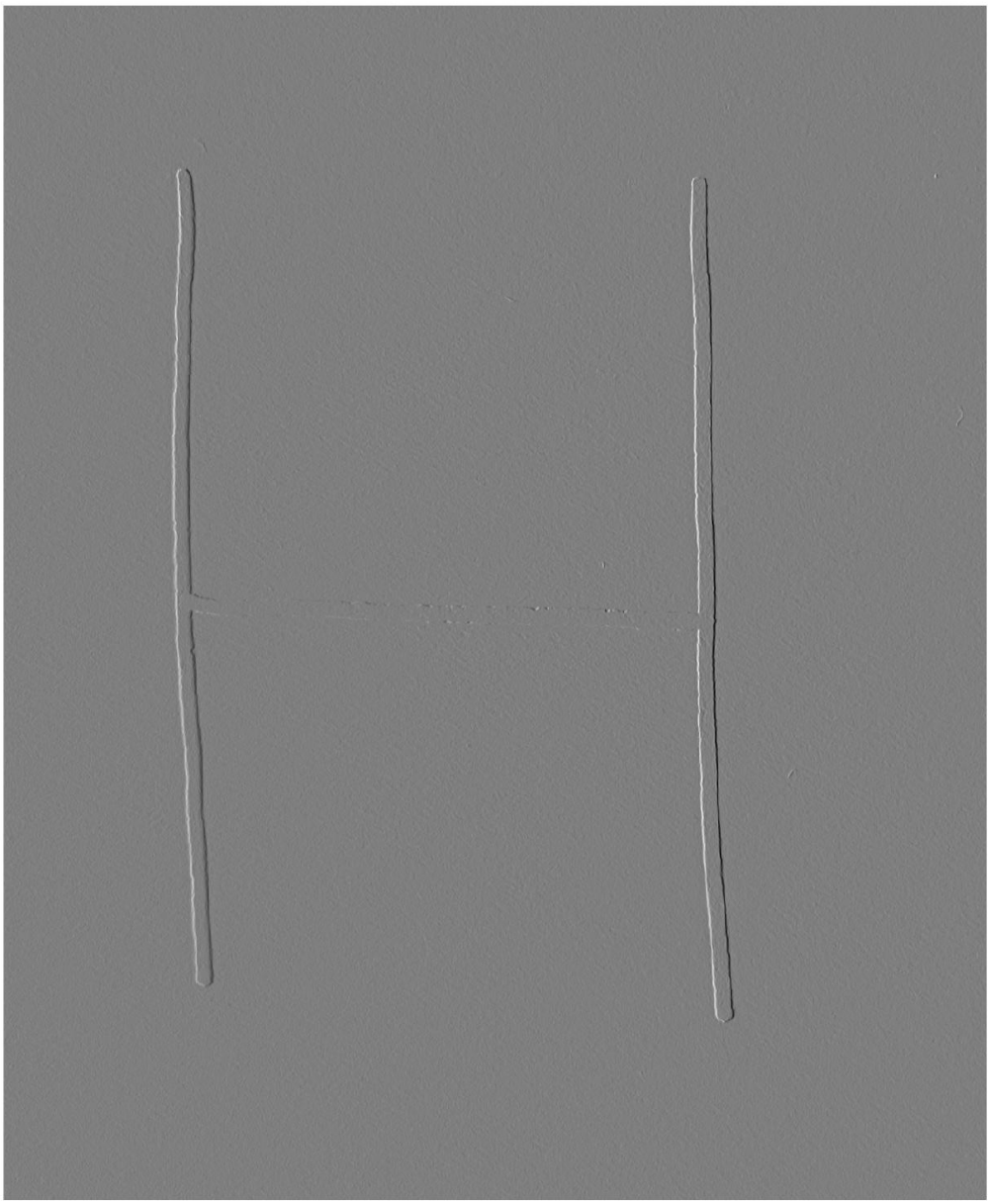
Visualizing Gradients

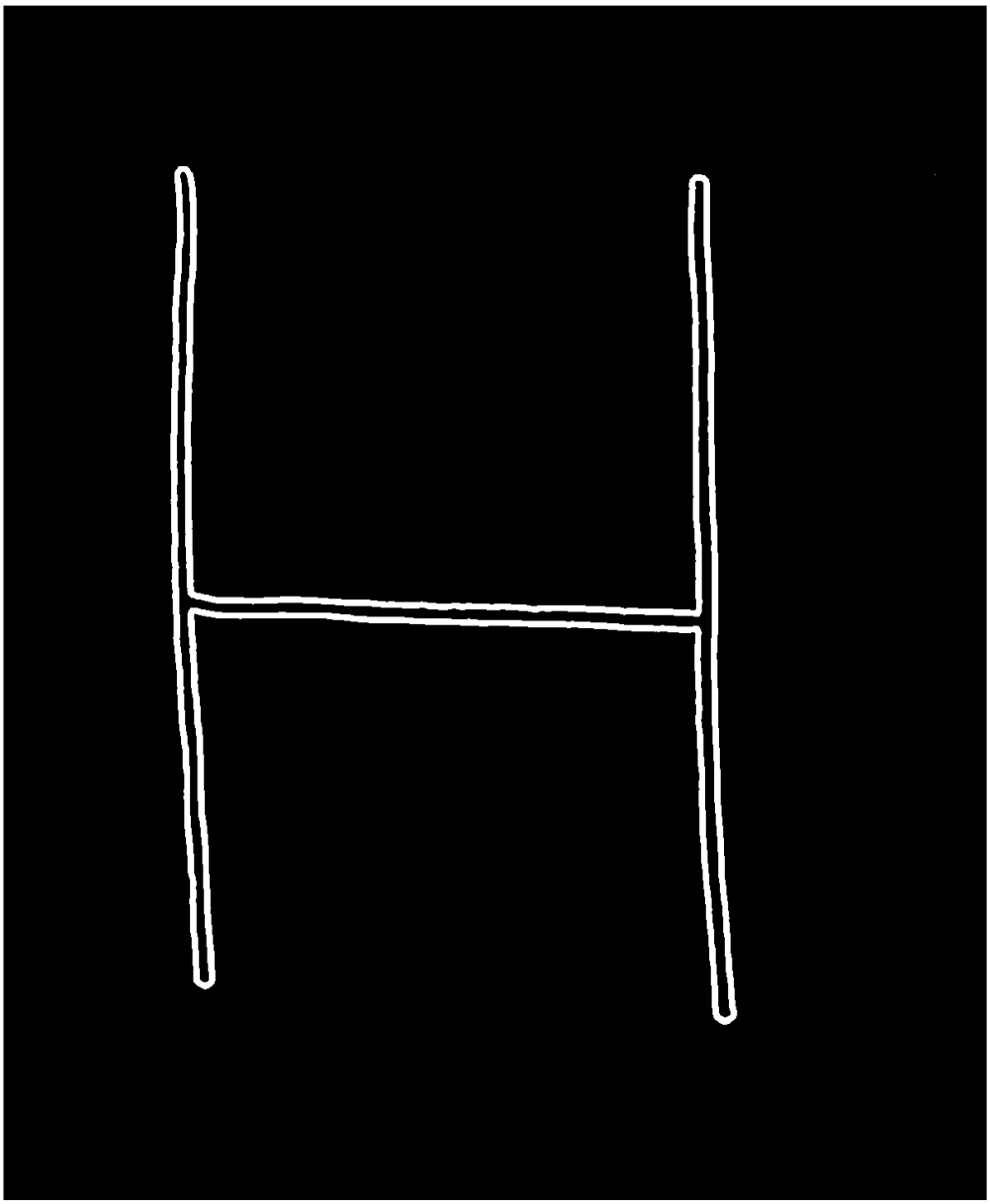
Consider using edge detection for handwriting analysis of the following image:

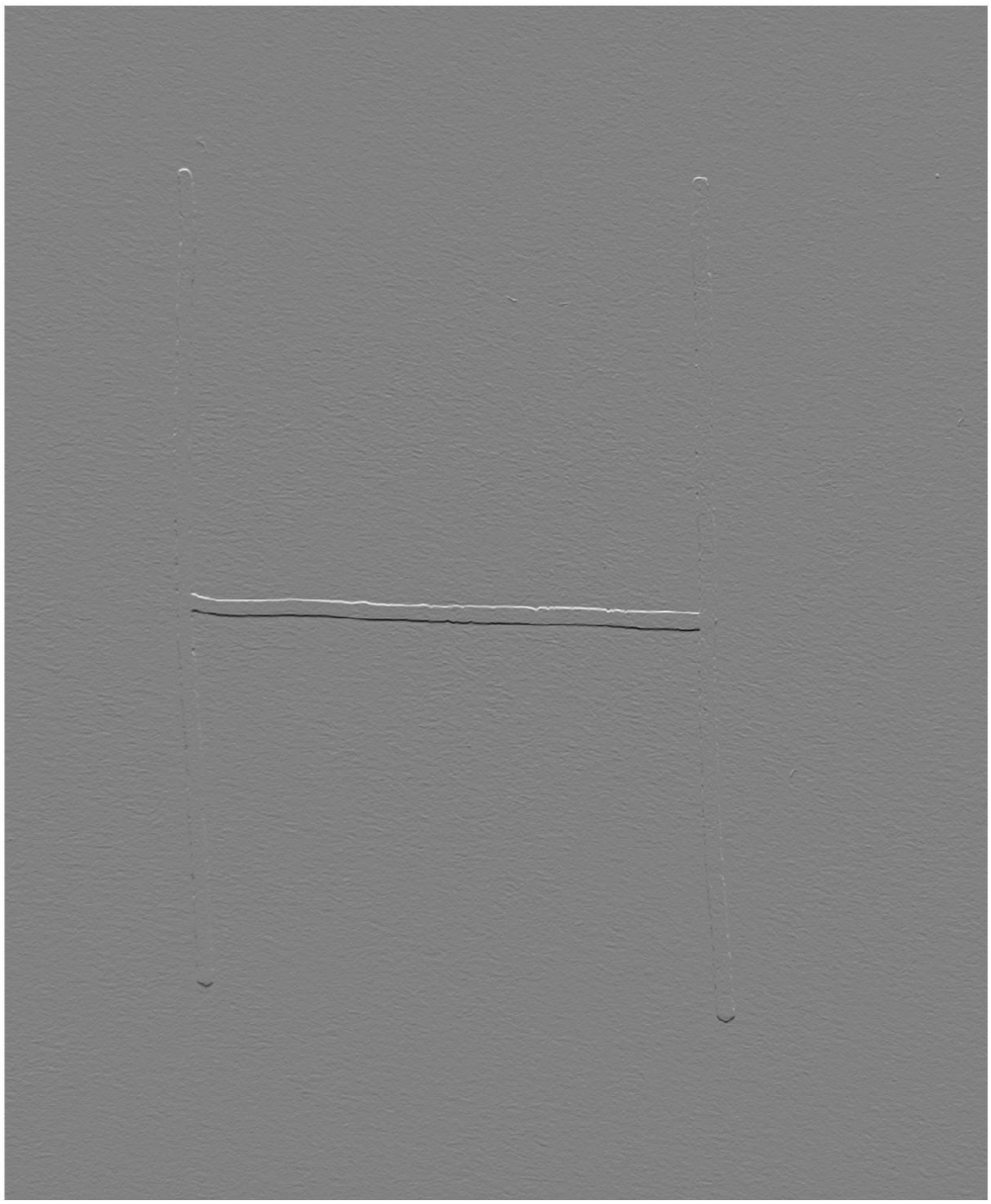


Which of the following represents the vertical gradient of the image's edge detection?

Note: this image was first filtered with imgaussfilt.







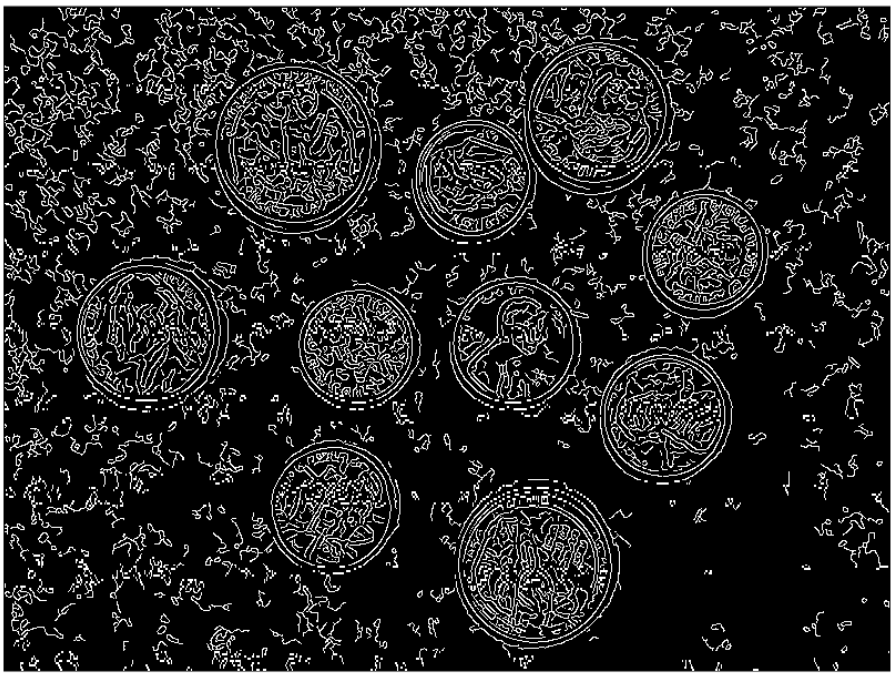
Correct

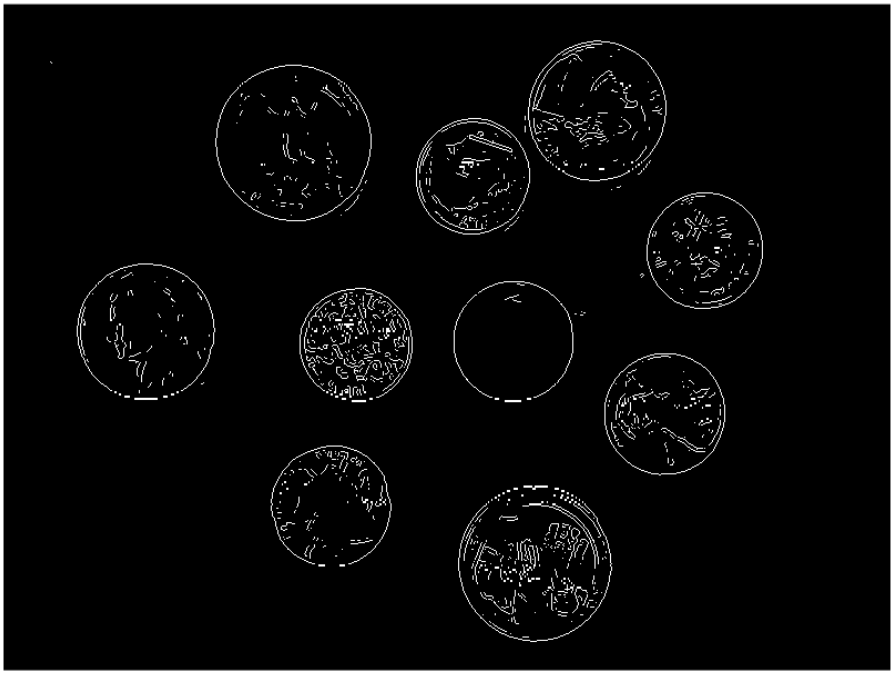
Notice how the strongest edge is the center of the "H". Since edges are found perpendicular to the gradient, the vertical gradient is largest where there are strong horizontal edges.

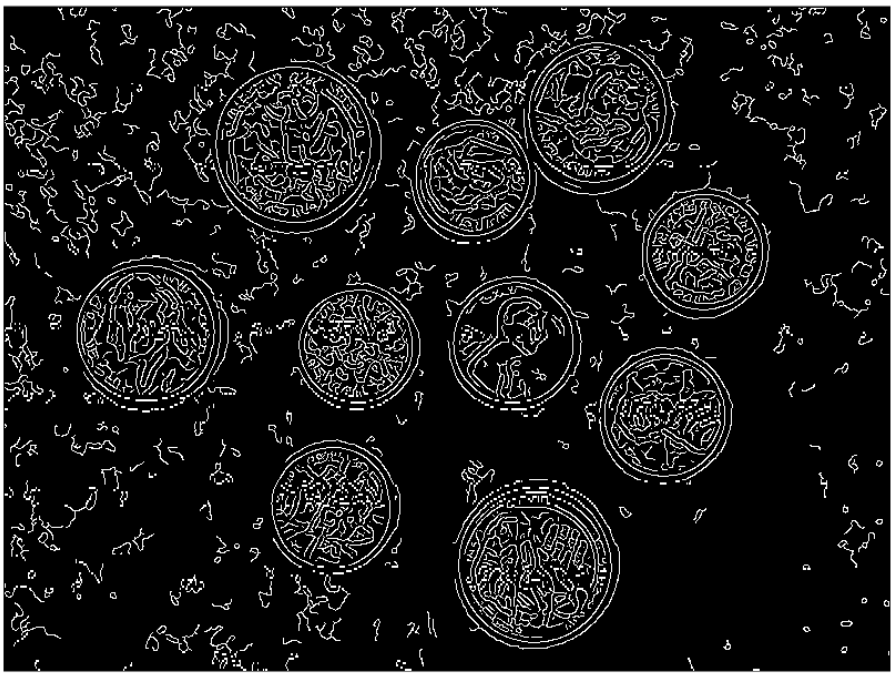
Question 4

Detecting Edges

Detect edges using the filtered **coins1.jpg** image described above. Which of these images shows the edges detected using the Canny method?







Correct

5. Use the `imfindcircles` function to find only the four largest coins. What value can be used as the lower value of the radius range to eliminate the smaller coins?

```
56
```

Correct

The smaller coins mostly have radii between 50 and 55, whereas the larger coins all have radii above 60.

6. Which of the following is the result of using `imfindcircles` and `viscircles` to count the number of coins with radius less than 65. How many are there?

8

Correct