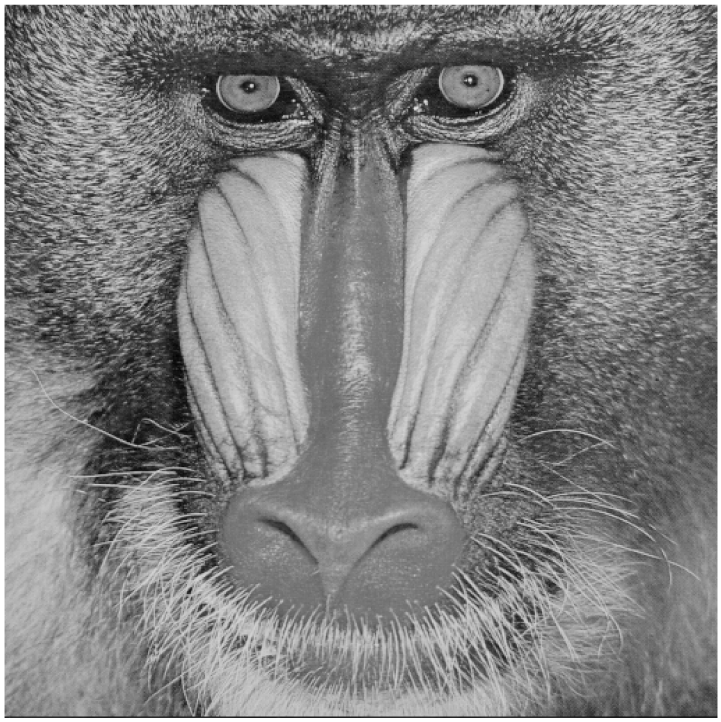
Question 2

Read input file:

```
im = imread("/MATLAB Drive/images/mandrill.tif");
imshow(im)
```



Floyd-Steinberg

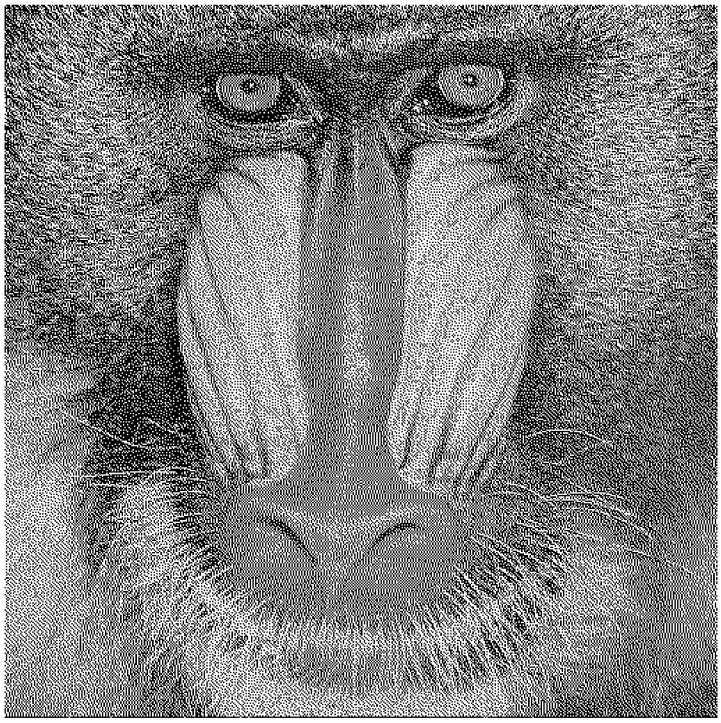
Function as defined in the text book:

```
function y = fs(x,k)
    height = size(x,1);
    width = size(x,2);
    ed = [0 0 0 7 0;0 3 5 1 0;0 0 0 0 0]/16;
    y = uint8(zeros(height,width));
    z = zeros(height+4,width+4);
    z(3:height+2,3:width+2) = x;
    for i = 3:height+2,
        for j = 3:width+2,
            quant = floor(255/(k-1))*floor(z(i,j)*k/256);
            y(i-2,j-2) = quant;
            e = z(i,j)-quant;
            z(i:i+2,j-2:j+2) = z(i:i+2,j-2:j+2)+e*ed;
        end
    end
```

```
end
```

Dithering execution using k = 2 levels:

```
imfs = fs(im,2);
imshow(imfs)
```



Jarvis-Judice-Ninke

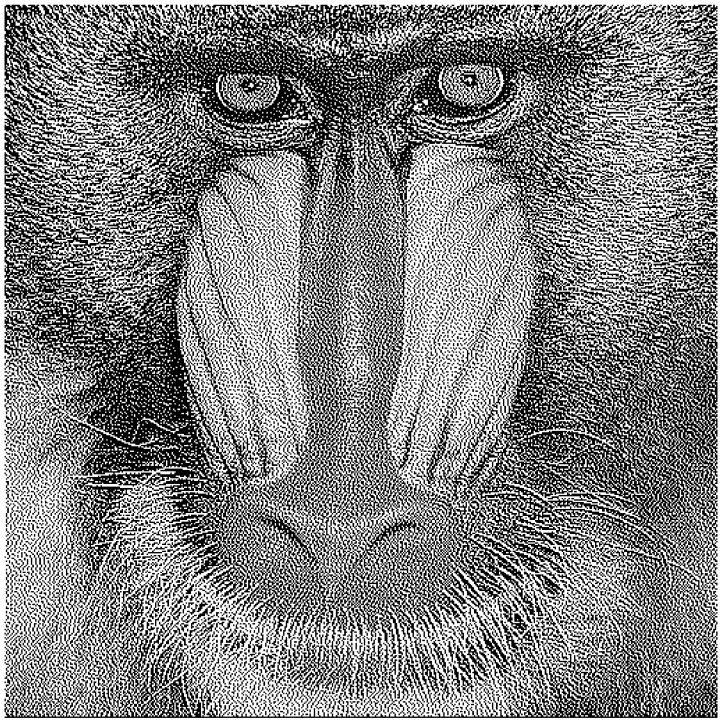
Function as defined in the text book:

```
function out = jjn(im)
    height = size(im,1);
    width = size(im,2);
    out = zeros(size(im));
    ed = [0 0 0 7 5;3 5 7 5 3;1 3 5 3 1]/48;
    z = zeros(size(im)+4);
    z(3:height+2,3:width+2) = double(im);
    for i = 3:height+2,
        for j = 3:width+2,
            quant = 255*(z(i,j)>=128);
            out(i-2,j-2) = quant;
            e = z(i,j)-quant;
            z(i:i+2,j-2:j+2) = z(i:i+2,j-2:j+2)+e*ed;
        end
    end
```

```
    out = im2uint8(out);
end
```

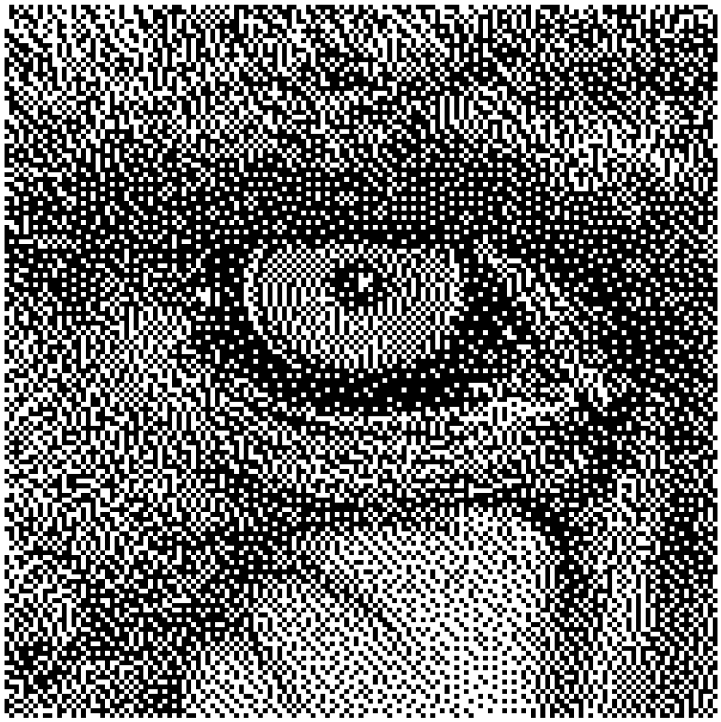
Dithering execution at 2 levels:

```
imjjn = jjn(im);
imshow(imjjn)
```

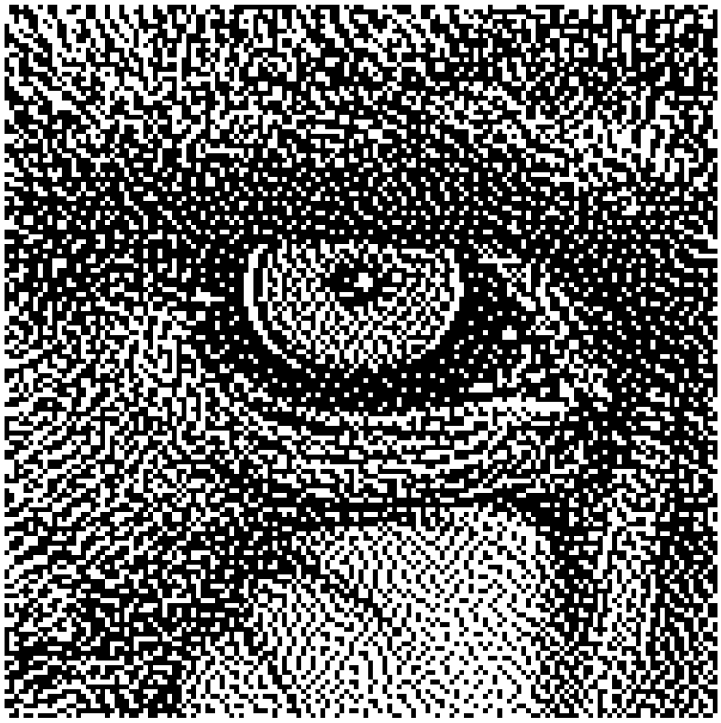


Both dithering executions result in a decent 2 level interpretation of the original grayscale image. I would say the quality is pretty similar, however if we zoom in a little bit more:

```
imfszoom = imfs(1:149,103:251);
imjjnzoom = imjjn(1:149,103:251);
imshow(imfszoom)
```



```
imshow(imjjnzoom)
```



We can see that the Jarvis-Judice-Ninke's distribution of black vs white pixels appears a little more "natural" and free flowing, whereas the Floyd-Steinberg image has a lot more jagged lines. JJN's has a more complex method of including 12 pixels into the calculations instead of the 4 that FS uses, so that may be a contributing factor to JJN's higher quality image. You can also see that the JJN image is a little more consistant with the coloring of certain areas.This is apparent when looking at the eye in the oiginal image, where the JJN's all white depiction of the whites of the eye is a little less noisy than the FS image.

```
imzoom = im(1:149,103:251);
imshow(imzoom)
```