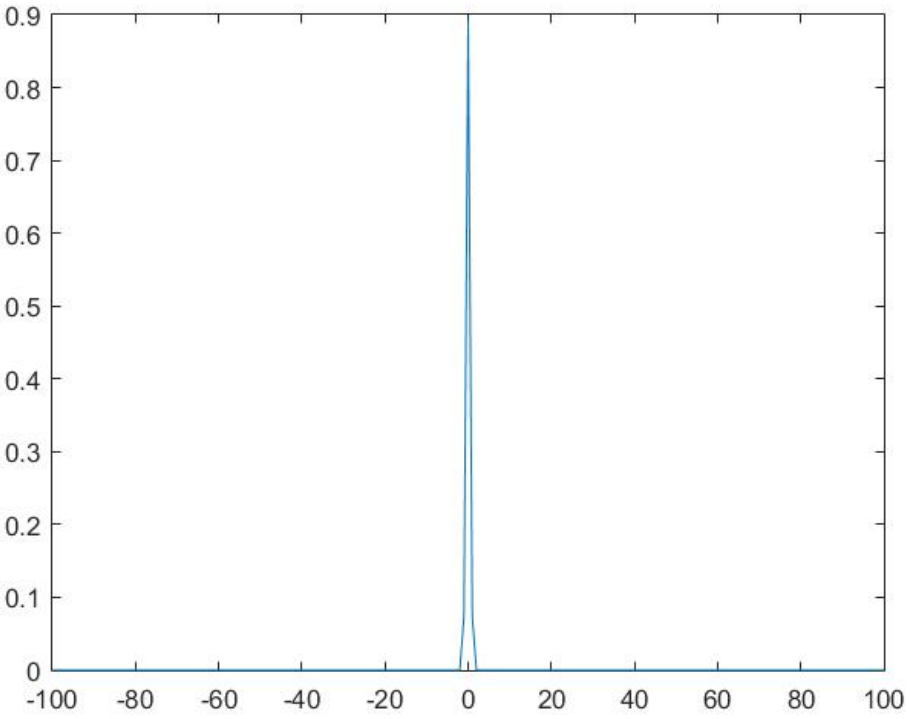
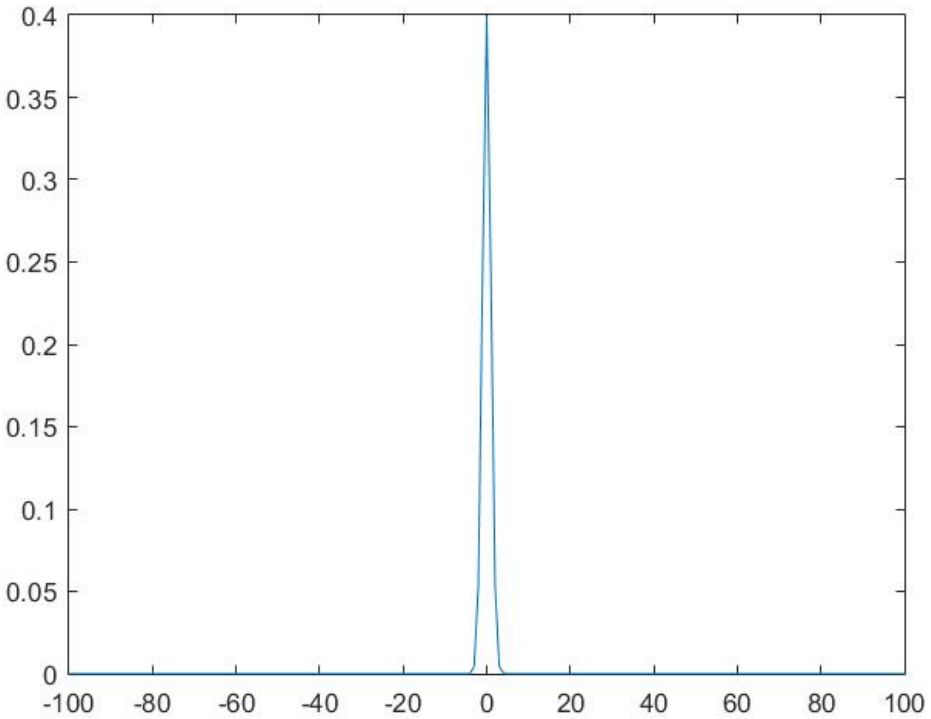
1) I plotted the Gaussian function for given variables and for different variance values. With increasing variance the graphic becomes smoother and becomes more like a bell shape.

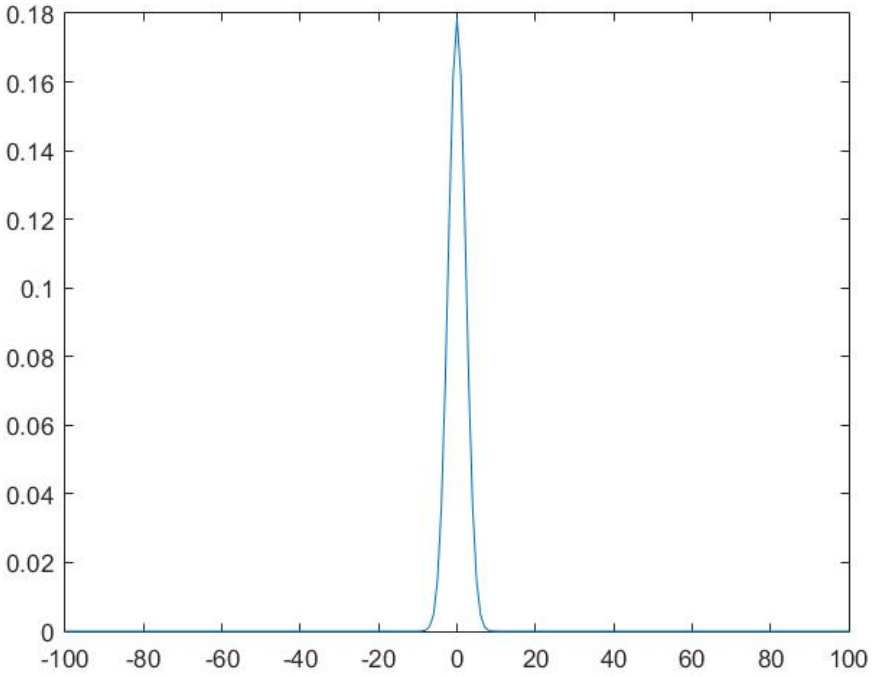
Var → 0.2




Var → 1

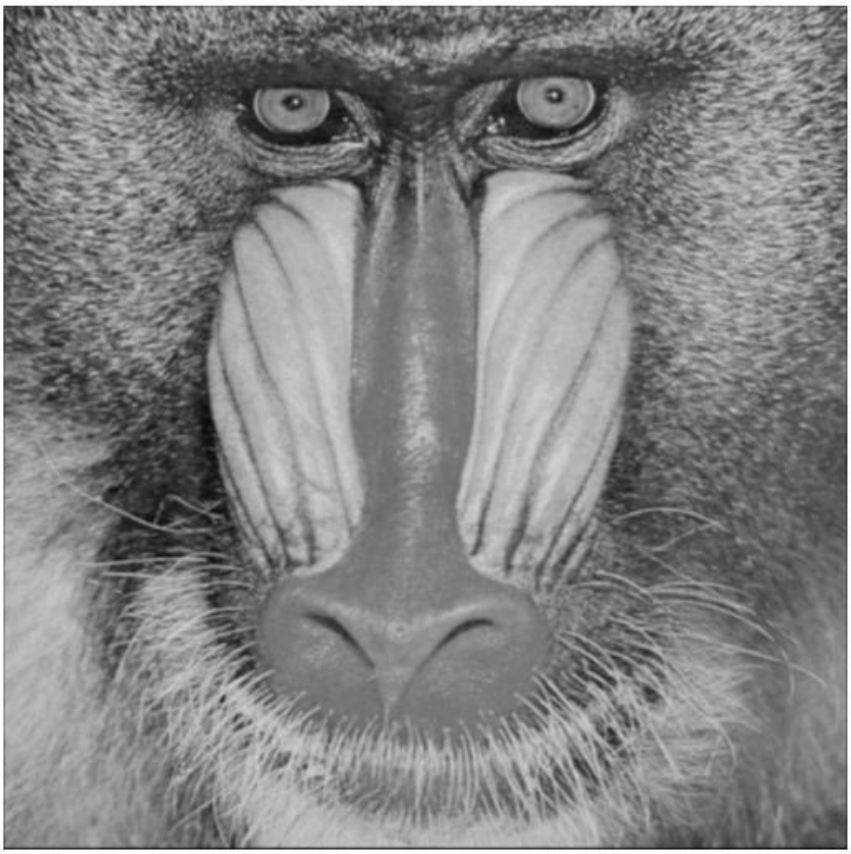


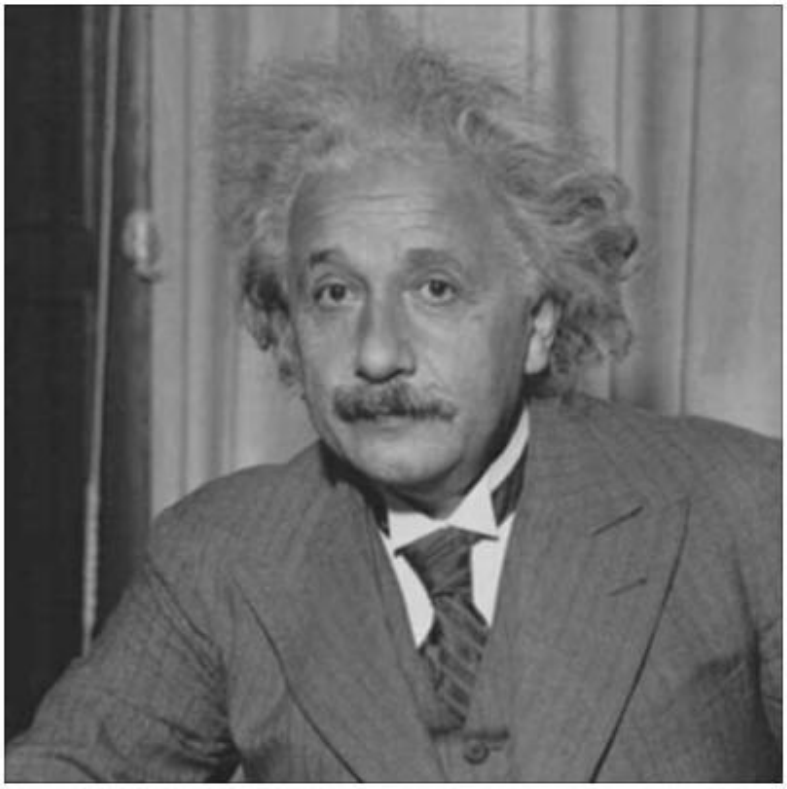
Var → 5



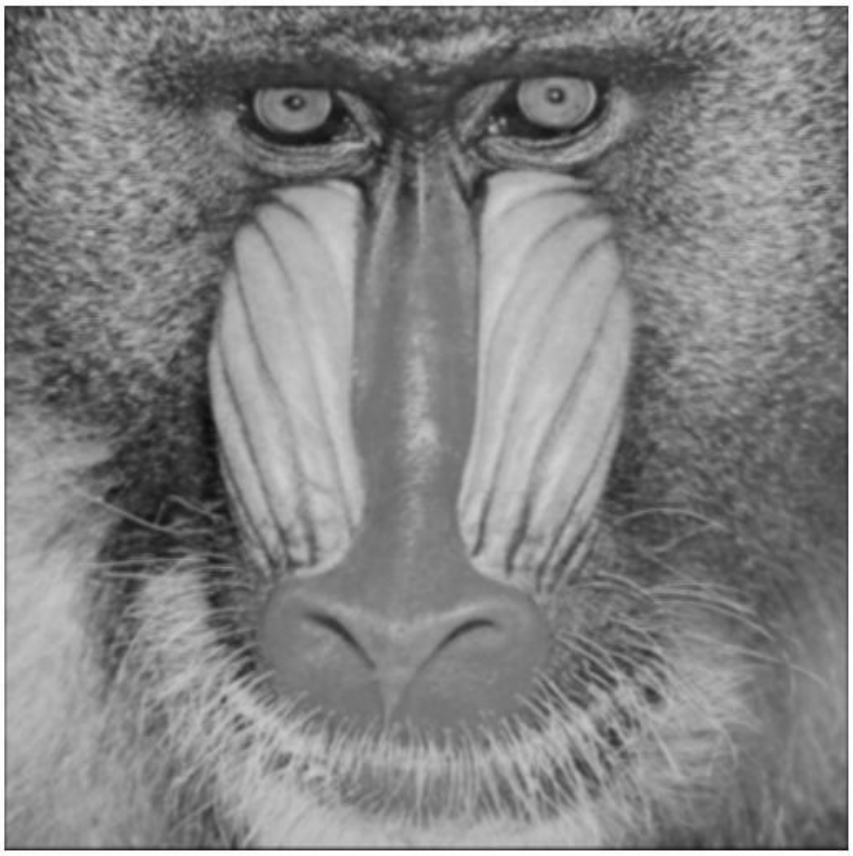

2) I created an image including the padding and looped through it. I multiplied the coordinates according to the filters' coefficients and then normalized and pasted these values to a new image.

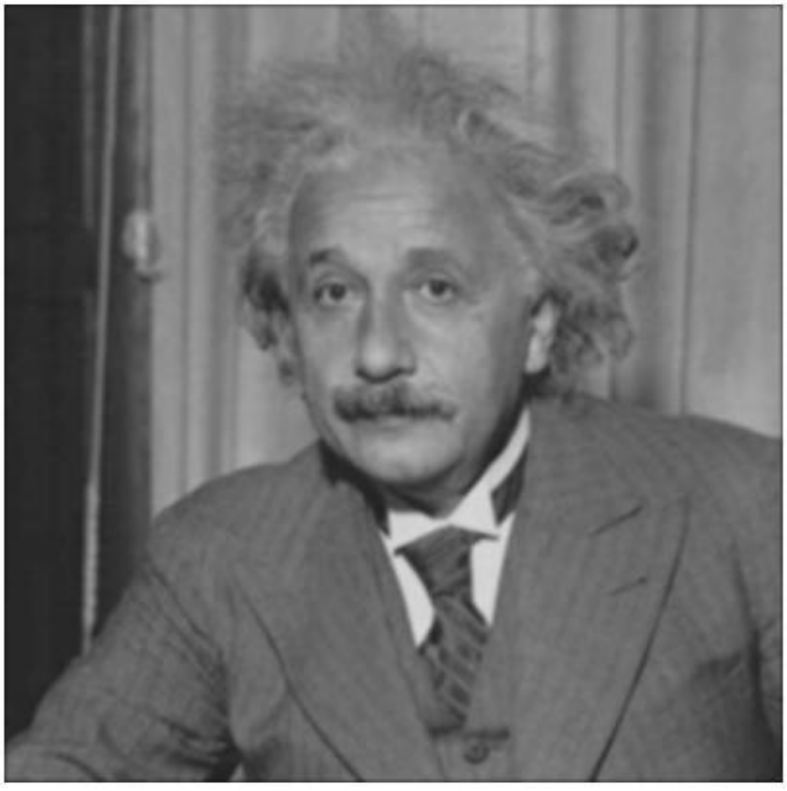
3x3 results:



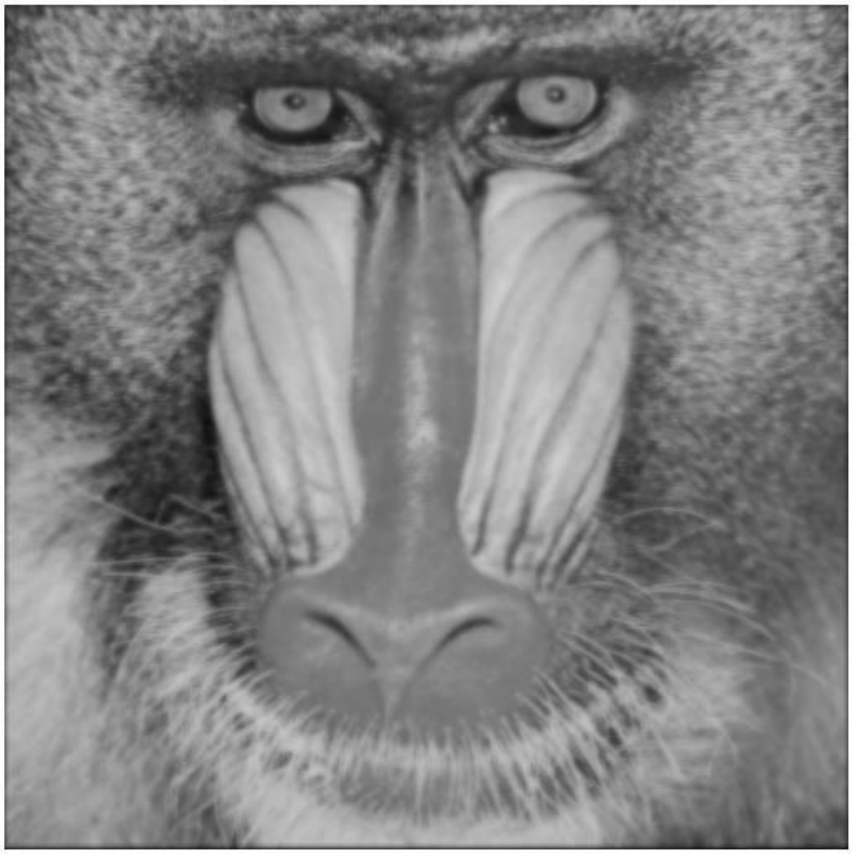


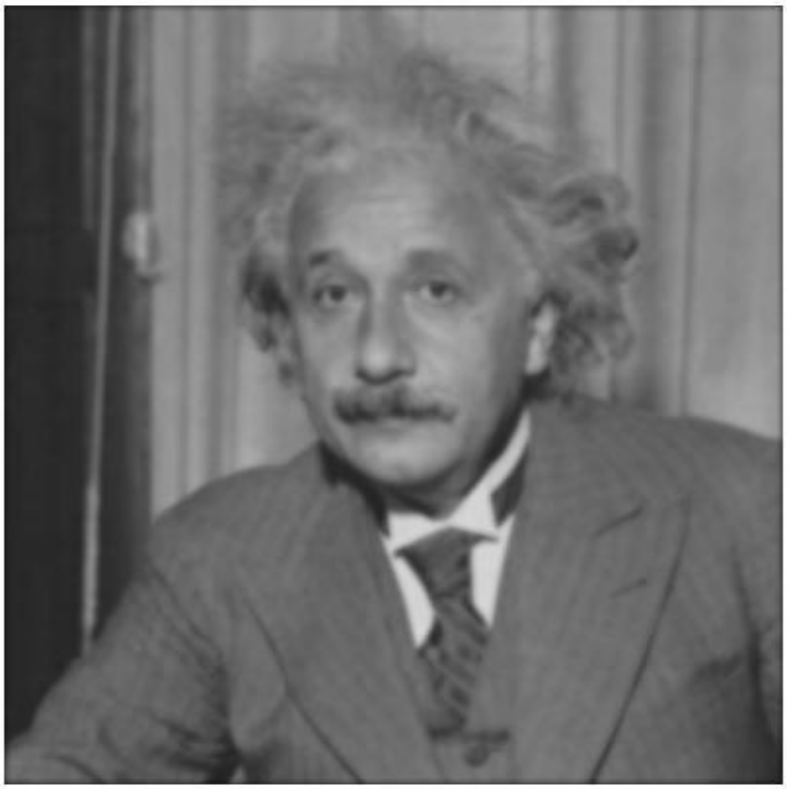
5x5 results:





7x7 results:





3) Used F + (F – F*H)*a formula. With increasing a values image becomes sharper as it is with Gaussian curve at question 1. Created 4 different images for each filter with a constants 2, 3, 6 and 9.

3x3 filter sharpened with a = 2 , 3 , 6 , 9:

5x5 filter sharpened with a = 2 , 3 , 6 , 9:

7x7 filter sharpened with a = 2 , 3 , 6 , 9: