Assignment 1

Ans1- a)

gaussian mask at sigma=1

h1=

0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0002	0.0011	0.0018	0.0011	0.0002	0.0000	0.0000
0.0000	0.0002	0.0029	0.0131	0.0215	0.0131	0.0029	0.0002	0.0000
0.0000	0.0011	0.0131	0.0586	0.0965	0.0586	0.0131	0.0011	0.0000
0.0001	0.0018	0.0215	0.0965	0.1592	0.0965	0.0215	0.0018	0.0001
0.0000	0.0011	0.0131	0.0586	0.0965	0.0586	0.0131	0.0011	0.0000
0.0000	0.0002	0.0029	0.0131	0.0215	0.0131	0.0029	0.0002	0.0000
0.0000	0.0000	0.0002	0.0011	0.0018	0.0011	0.0002	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000

gaussian mask at sigma=3

h2=

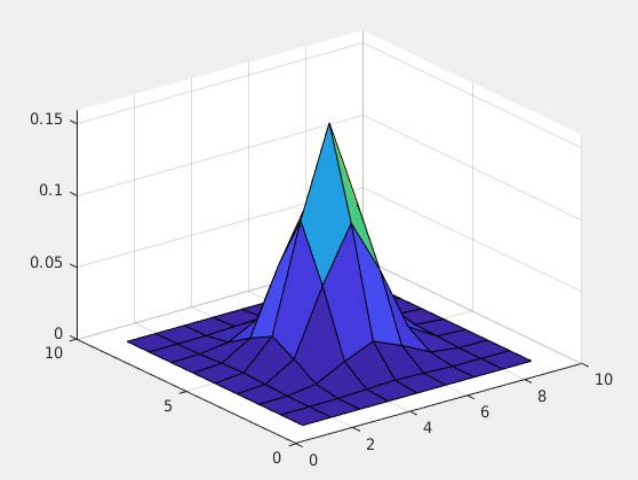
0.0040	0.0059	0.0077	0.0091	0.0096	0.0091	0.0077	0.0059	0.0040
0.0059	0.0086	0.0114	0.0135	0.0142	0.0135	0.0114	0.0086	0.0059
0.0077	0.0114	0.0150	0.0178	0.0188	0.0178	0.0150	0.0114	0.0077
0.0091	0.0135	0.0178	0.0210	0.0222	0.0210	0.0178	0.0135	0.0091
0.0096	0.0142	0.0188	0.0222	0.0235	0.0222	0.0188	0.0142	0.0096
0.0091	0.0135	0.0178	0.0210	0.0222	0.0210	0.0178	0.0135	0.0091
0.0077	0.0114	0.0150	0.0178	0.0188	0.0178	0.0150	0.0114	0.0077
0.0059	0.0086	0.0114	0.0135	0.0142	0.0135	0.0114	0.0086	0.0059
0.0040	0.0059	0.0077	0.0091	0.0096	0.0091	0.0077	0.0059	0.0040

gaussian mask at sigma=20

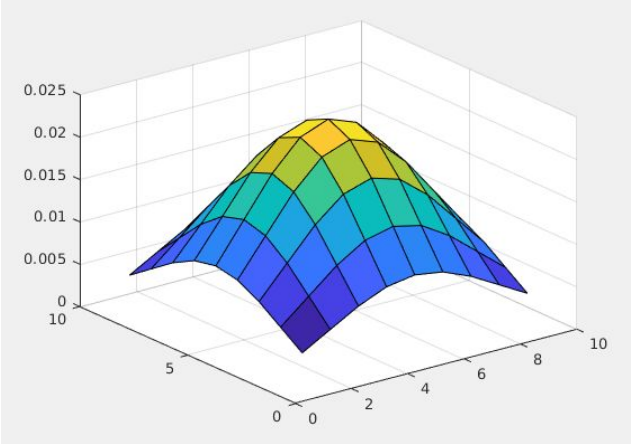
h3=

0.0121	0.0122	0.0122	0.0123	0.0123	0.0123	0.0122	0.0122	0.0121
0.0122	0.0123	0.0124	0.0124	0.0124	0.0124	0.0124	0.0123	0.0122
0.0122	0.0124	0.0124	0.0125	0.0125	0.0125	0.0124	0.0124	0.0122
0.0123	0.0124	0.0125	0.0125	0.0125	0.0125	0.0125	0.0124	0.0123
0.0123	0.0124	0.0125	0.0125	0.0126	0.0125	0.0125	0.0124	0.0123
0.0123	0.0124	0.0125	0.0125	0.0125	0.0125	0.0125	0.0124	0.0123
0.0122	0.0124	0.0124	0.0125	0.0125	0.0125	0.0124	0.0124	0.0122
0.0122	0.0123	0.0124	0.0124	0.0124	0.0124	0.0124	0.0123	0.0122
0.0121	0.0122	0.0122	0.0123	0.0123	0.0123	0.0122	0.0122	0.0121

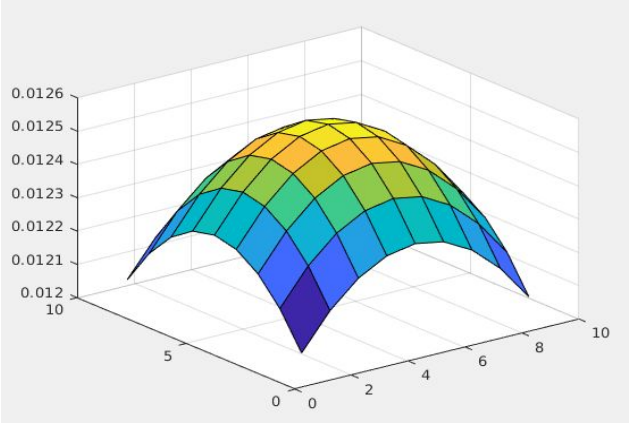
Surface of sample from gaussian at sigma=1



Surface of sample from gaussian at sigma=3



Surface of sample from gaussian at sigma=20



b)Comments: It is very difficult to observe the subtle difference. It is better to generate image using code or view image in the results folder. The image gets more blurred as the sigma increases.

filtered image (3_1.jpg) at sigma=1

filtered image (3_1.jpg) at sigma=3

filtered image (3_1.jpg) at sigma=20

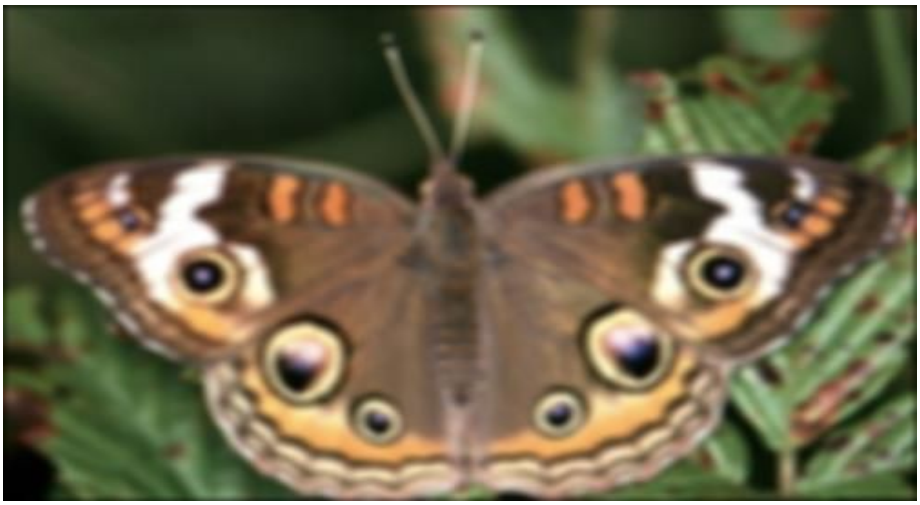
filtered image (7_1.jpg) at sigma=1

filtered image (7_1.jpg) at sigma=3

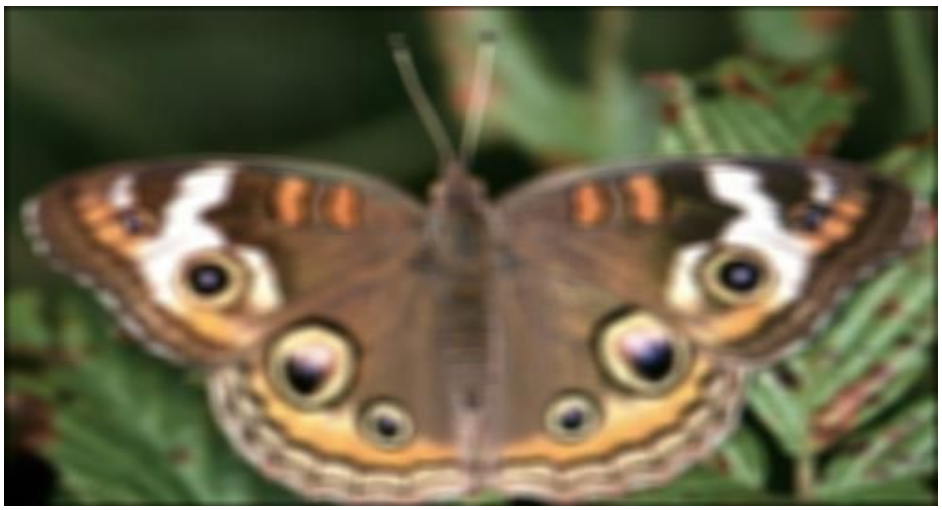
filtered image (7_1.jpg) at sigma=20

filtered image (butterfly.jpg) at sigma=1

filtered image (butterfly.jpg) at sigma=3



filtered image (butterfly.jpg) at sigma=20



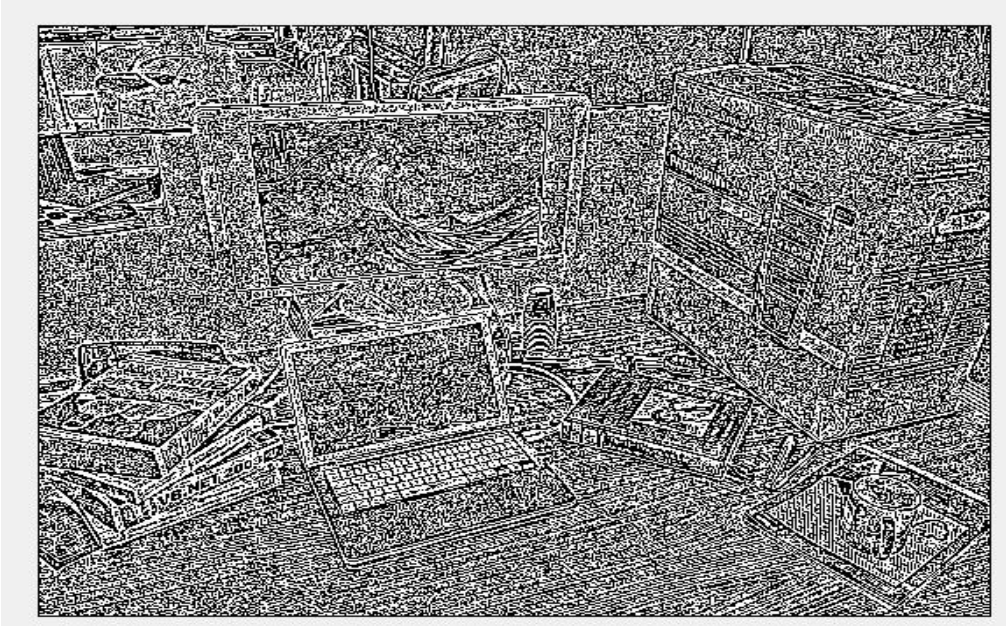
Ans2-a)DOG filter (sigma1=3 and sigma2=10)

h=

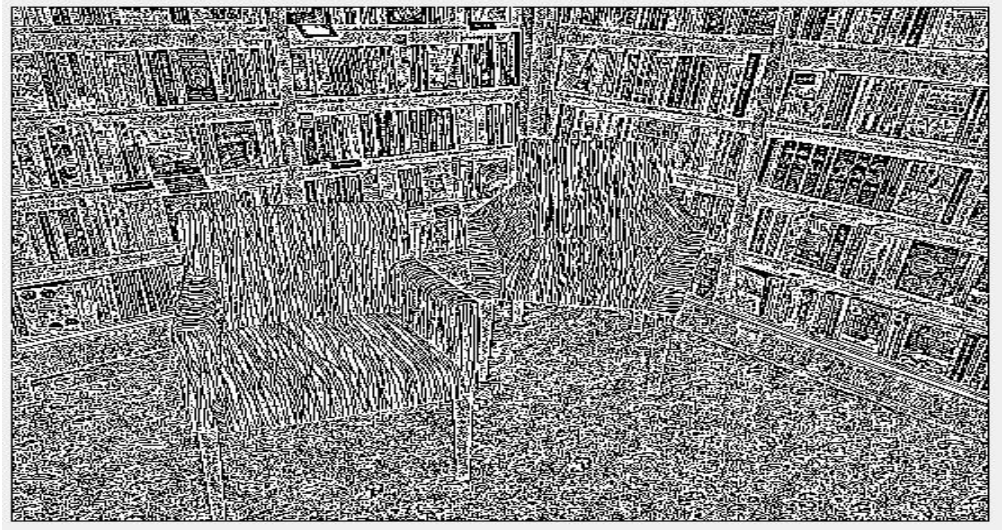
0.0058	0.0054	0.0046	0.0038	0.0032	0.0030	0.0032	0.0038	0.0046	0.0054	0.0058
0.0054	0.0043	0.0030	0.0016	0.0005	0.0001	0.0005	0.0016	0.0030	0.0043	0.0054
0.0046	0.0030	0.0009	-0.0013	-0.0029	-0.0036	-0.0029	-0.0013	0.0009	0.0030	0.0046
0.0038	0.0016	-0.0013	-0.0042	-0.0064	-0.0073	-0.0064	-0.0042	-0.0013	0.0016	0.0038
0.0032	0.0005	-0.0029	-0.0064	-0.0091	-0.0101	-0.0091	-0.0064	-0.0029	0.0005	0.0032
0.0030	0.0001	-0.0036	-0.0073	-0.0101	-0.0111	-0.0101	-0.0073	-0.0036	0.0001	0.0030
0.0032	0.0005	-0.0029	-0.0064	-0.0091	-0.0101	-0.0091	-0.0064	-0.0029	0.0005	0.0032
0.0038	0.0016	-0.0013	-0.0042	-0.0064	-0.0073	-0.0064	-0.0042	-0.0013	0.0016	0.0038
0.0046	0.0030	0.0009	-0.0013	-0.0029	-0.0036	-0.0029	-0.0013	0.0009	0.0030	0.0046
0.0054	0.0043	0.0030	0.0016	0.0005	0.0001	0.0005	0.0016	0.0030	0.0043	0.0054
0.0058	0.0054	0.0046	0.0038	0.0032	0.0030	0.0032	0.0038	0.0046	0.0054	0.0058

b)

Filtered image 3_1



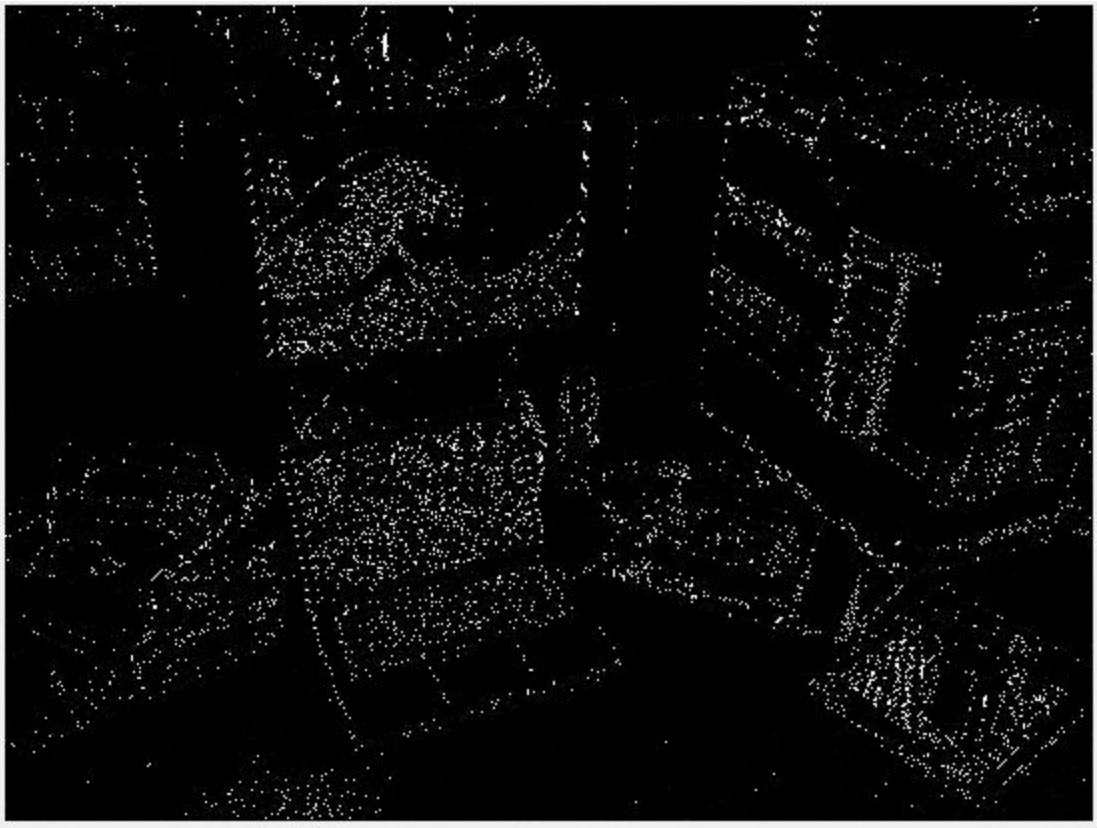
Filtered image 7_1



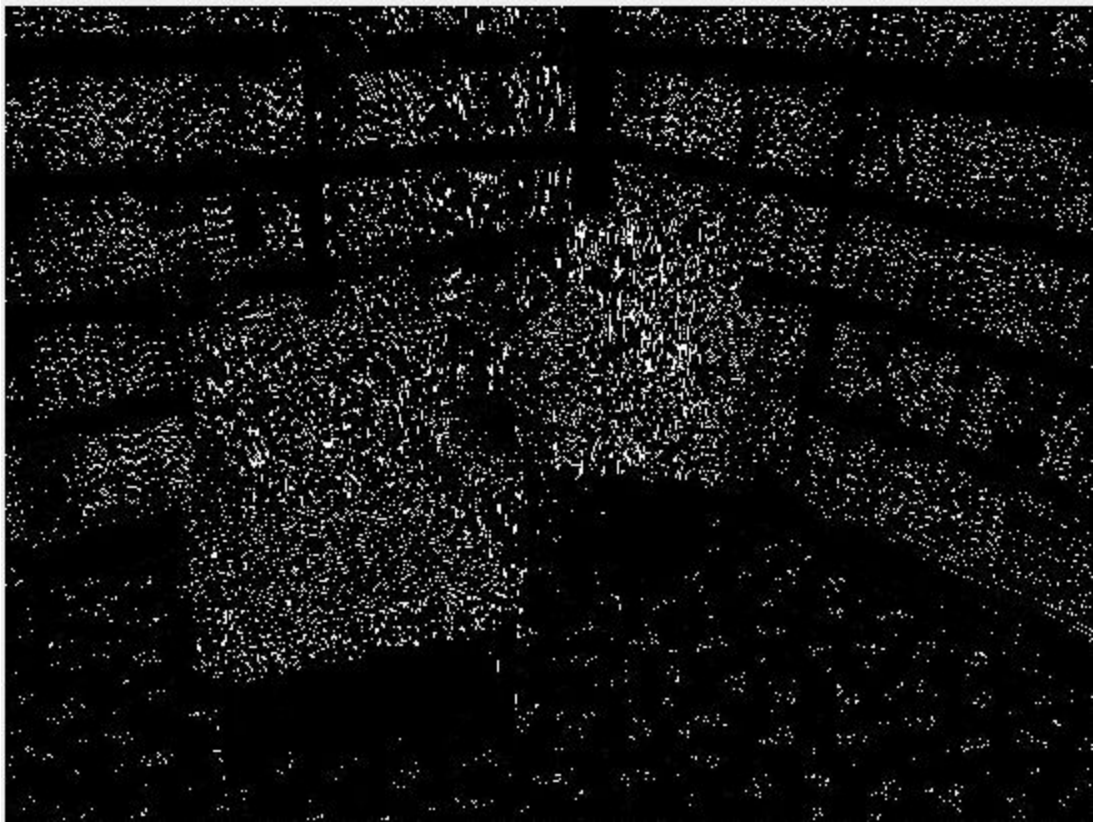
Filtered image butterfly

Comments-all the image above are converted from grayscale to a image where intensity values are either 255 or 0 for better contrast.

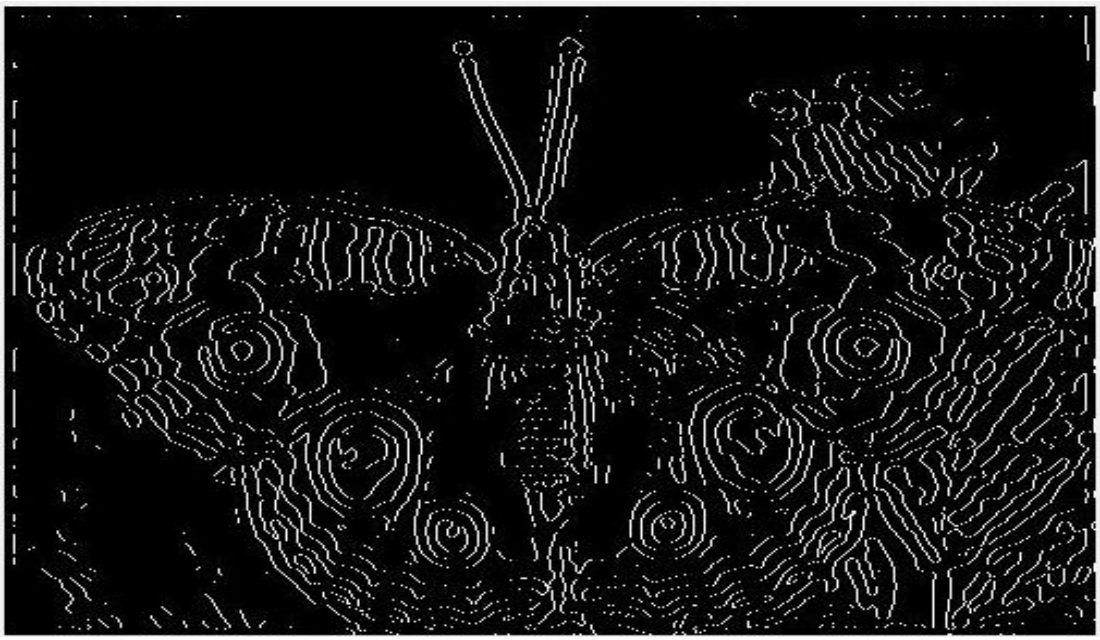
c) detected edge for 3_1



detected edge for 7_1



detected edge for butterfly



Comments: we can get more edge or less edge in the above images if required depending upon our need to get edges of less or more variance across neighbourhood. The code is generic enough to accommodate the change.