AIG210 – Worksheet 4 – Noise and Filtering
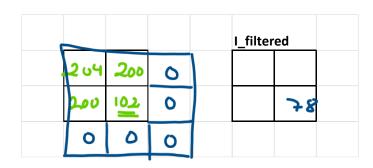
1- Assuming the following original image and its noisy version,

I_in			I_noisy	
0	200		204	200
200	200		200	102

a) Apply a 3 x 3 averaging filter to the noisy image, assuming <u>zero</u> padding. Show padded image.

0	0	0
0	204	200
0	200	102

I_filtered

78	

$$\frac{0 \times 5 + 2 \times 200 + 204 + 102}{9} \simeq 78$$

78	78
78	78

204	200	0
200	102	0
0	0	0

I_filtered

	78

$$\frac{0 \times 5 + 2 \times 200 + 102 + 204}{9} \simeq 78$$

b) Apply a 3 x 3 averaging filter to the noisy image, assuming <u>replicate</u> (or clamp) padding.
   Show padded image.

I_in

0	200
200	200

I_noisy

204	200
200	102

204	200	200
204	200	200
200	102	102

I_filtered

	179

$$\frac{2\times204 + 5\times200 + 2\times102}{9} \simeq 179$$

191	179
179	157

204	204	200
204	204	200
200	200	102

I_filtered

191	

$$\frac{4\times204 + 4\times200 + 102}{9} \simeq 191$$

2- Given the following 10 x 10 image, apply a 3 x3 averaging filter, assuming zero padding to find values at marked pixels.

$$F_A = \frac{128}{9}$$

$$F_B = \frac{2 \times 128}{9}$$

$$F_C = \frac{100}{9}$$

$$P_D = \frac{100}{9}$$

$$P_G = \frac{1200}{9}$$

$$f_E = \frac{800}{9}$$

Filtered image:

0	0	0	0	0	11	11	11	0	0
0	14	14	14	0	11	11	11	0	0
0	28	28	28	0	11	11	11	0	0
0	43	43	43	22	44	67	67	44	22
0	43	43	43	44	89	133	133	89	44
0	43	43	43	44	89	133	133	89	44
0	28	28	28	22	44	67	67	44	22
0	14	14	14	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0