بسم الله الرحمن الرحيم

HW 1

Electrical Engineering Department
EE 410 Digital Image Processing (052)
Instructor: Dr. Omar A. Al-Swailem

Due Monday, March 13th, 2006

Q 1: In the following statements, write True [T] or False [F] in the spaces provided.
Correct Answer = 2.0 point, No Answer = 0.0 point, Wrong Answer = -1 point.

	(1) Spatial resolution of a digital image is determined mainly by the sampling factor.
	(2) In general, selecting a suitable value for spatial and gray level resolutions depends on the amount of activity, details, and application of the image
	(3) The masking operation on an image is a neighborhood processing technique.
	(4) In image averaging technique, the availability of more images helps in decreasing the variability of pixel values at each location.
	(5) In a digital image, reduction in spatial resolution results in false contours while reduction in quantization levels can exhibit a checkerboard appearance.

Q 2: Compute the number of bits that represents an image that has 64 gray levels and a size of 512×512 pixels? What is the time (in seconds) required to transmit this image over a 14.4 kbits/sec modem?

Q 3
(a) Discuss the effects of applying the following 3×3 masks to the given image.
(b) Discuss the different effects between applying a 3×3 smoothing and a 3×3 median filters to the image. Show your work.

Mask 1

-1	-1	-1
0	0	0
1	1	1

Mask 2

-1	0	1
-1	0	1
-1	0	1

Image

1	1	1	10	10	10
1	1	1	10	10	10
1	1	1	10	10	10
1	1	1	10	10	10

Q 4: Give **a brief** definition for False Contouring and Checkerboard pattern and indicate their origin.

Q 5: A 5×5 smoothing mask is applied to a rectangular shape of size 4×2 pixels in the middle of an image. What would be the blurring size (in pixels) of this shape in the smoothed image?

Q 6: Determine if the two regions shown R_1 and R_2 , (R_1 is the left region surrounded by the dotted line, and R_2 is the right region surrounded by the dotted line.), are 4-, 8-, and/or m-connected, for the cases, **Explain and justify your answers**:

(i) V={0,1,2} , (ii) V={1}

(1)	2	1	2	2	1	1	2	1
1	2	1	2	(1)	1	1	2	1
1	2	1	2	2	0	1	2	1
1	2	1	2	0	2	1	2	1
1	2	1	2	2	2	1	2	1

Consider V={0,1,2} Compute D_e , D_4 , *and* D_8, between the two circled pixels shown?