

EE435 Spring 2009 PS01 (Problem Set 01)

Assigned: Monday 1/12/09 Due: Wednesday 1/21/09

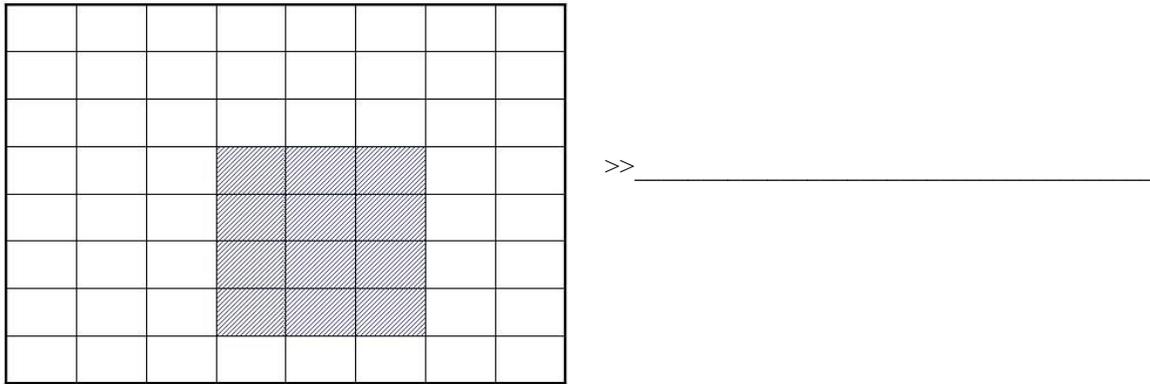
Note: Use MATLAB whenever possible.

1. Explain what is meant by (a) *spatial* resolution; (b) *spectral* resolution; (c) *radiometric* resolution; (d) *time* (or temporal) resolution.
2. (a) Define what is meant by a convex region in a 2D binary image; (b) draw an example of a convex and a non-convex region; (c) define a convex hull; (iv) draw the convex hull of the non-convex region you drew in part (b).
3. Download an interesting color image from the Internet.
 - Use the *imfinfo* function to give you some pertinent information about the image. What are the values of:
 Colortype?
 Height, width?
 File size (bytes)?
 Bit depth?
 - Read the image into MATLAB as a variable using the *imread* function (note: the filename must be in single quotes). Display the image using the *imshow* function.
 - Apply the *rgb2gray* function to the image and display the result. What happened?
 - After applying the *rgb2gray* function, subtract each value from 255 and display the result. What happened?
4. Suppose the following 8x8 array represents an image. As far as MATLAB is concerned, what are the row and column numbers of pixels A, B and C?

						B	
		A					
C							

Pixel	Row Number	Column Number
A		
B		
C		

5. Suppose the following 8x8 array represents an image, and this array is called variable *P* in the MATLAB workspace. What command can be used to assign the shaded pixels of *P* to a new array *Q*?



6. What is the range of possible pixel values for an image stored as the following data classes, and how many bytes of storage does each pixel require?

<u>Data Class</u>	<u>Range of Possible Numeric Values</u>		<u>Bytes of Storage per pixel</u>
logical	From _____	to _____	_____
uint8	From _____	to _____	_____
uint16	From _____	to _____	_____
double	From _____	to _____	_____

7. Suppose image A is defined as:

```
>>A=[2 4 6; 1 3 5; 9 8 7];
```

What is the value(s) of A(2:end,end)? Explain.

What is the value(s) of sum(A)? Explain.

What is the value(s) of sum(A(:))?Explain.

8. Suppose arrays A and B defined as:

```
>>A=[2]; B=[1 2;3 4];
```

What are the values of ndims(A) and ndims(B)? Are they the same or different? Why?

9. Suppose you execute the following code:

```
>>A=[2 4 6; 1 3 5; 9 8 7]
```

```
>>D=logical(eye(3)) % "eye(3)" forms a 3x3 identity matrix
```

```
>>A(D)
```

What is displayed on the screen? Explain.