CS 5420	**Digital Image Processing**	Test 2
Name:	Fall 2014	Max Pts: 48

Important: This is an open book test. You can use any books, notes, or paper but no electronic device. *Do not log into the computer during the test, or use any electronic or communications device. Change your cell phones to silent mode*. Any calculations and rough work can be done on the back side of the test pages. If there is a syntax error in any program segment, just write it down and you will get full credit for the problem. You will lose five points for not writing your name.

1. [6 pt] What is sifting? What is its physical significance?

2. [10 pt] Show that the DFT of the discrete function $f(x, y) = 1$ is

$$\mathcal{F}\{1\} = \delta(u, v) = \begin{cases} 1 & \text{if } u = v = 0 \\ 0 & \text{otherwise} \end{cases}$$

3. [10 pt] The contraharmonic mean filter at point (x, y) is given by

$$\hat{f}(x,y) = \frac{\sum_{(s,t)\in S_{xy}} g(s,t)^{Q+1}}{\sum_{(s,t)\in S_{x,y}} g(s,t)^{Q}}$$

S_{xy} is used for neighborhood at point (x, y).

(a) Explain why the filter is effective in eliminating pepper noise when Q is positive.

(b) Explain why the filter is effective in eliminating salt noise when Q is negative.

4. [6 pt] How can you estimate the noise parameters for a sensor that is available to you?

5. [6 pt] How many different shades of gray are there in a color RGB system in which each RGB image is an 8-bit image?

6. [10 pt] Given RGB values of two colors as (1, 1, 0) and (0.5, 1.0, 1.0). Convert those to HSI color model. How does the I value in HSI compare with the gray scale equivalent of those colors?