

# CS474/674 Image Processing and Interpretation

Fall 2009 – Dr. George Bebis

## Homework 1

Due Date: 9/15/2009

1. What linear transformation will change an image  $f(x,y)$  with gray levels ranging from 4 through 18 to an image  $g(x,y)$  with gray levels ranging from 10 through 50?
2. Consider the image shown below; compute the equalized image with eight possible gray levels. Show each step carefully. Draw the histograms of the original and equalized images as well as the equalization transformation.

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1 | 2 | 1 | 1 | 2 | 0 |
| 0 | 1 | 5 | 1 | 0 | 1 |
| 1 | 6 | 7 | 6 | 1 | 2 |

3. Problem 3.11 (page 194)
4. The gray levels at four pixels are shown below. What would be the gray level values at a position 1.3 pixels to the right of, and 1.8 of a pixel below, the upper-left original pixel assuming (i) zero-order interpolation, (ii) first-order interpolation using average, and (iii) first-order interpolation using a bilinear function.

|   |    |
|---|----|
| 1 | 5  |
| 7 | 15 |

5. **(Graduate Students Only)** Problem 3.7 (page 194)