PRINCE OF SONGKLA UNIVERSITY

FACULTY OF ENGINEERING

Final Examination: Semester II   Academic Year: 2005

Date:3 March 2006   Time: 09.00-12.00

Subject: 240-554 Image Processing   Room: R300

Instructions:

This exam has 6 problems, 7 pages, and 55 points. Answer all questions on the exam sheets. You may use the back of the pages for scratch work. This exam is open book.

Name:_____ Student code:_____

1 (10 pts) _____   5 (10 pts) _____

2 (15 pts) _____   6 (10 pts) _____

3 (15 pts) _____   7 (10 pts) _____

4 (10 pts) _____   8 (10 pts) _____

TOTAL _____

1. Use the LZW coding algorithm to encode the following sequence of 4-bit hexadecimal numbers: 555555 (10 points)

2. Erosion of a set A by structuring element B is a subset of A as long as the origin of B is contained by B. Give an example in which the erosion $A \ominus B$ lies outside, or partially outside, A. (10 points)

3. Show that by applying a 1-D mask [1 1 1] follows by applying another 1-D mask $\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ to

an image yields the same result as applying a 2-D mask $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$. (10 points)

4. The images shown are quite different, but their histograms are identical. Suppose that each image is blurred with a 3x3 smoothing mask, would the histogram still be identical after blurring? If your answer is no, sketch the two histogram. (10 points)
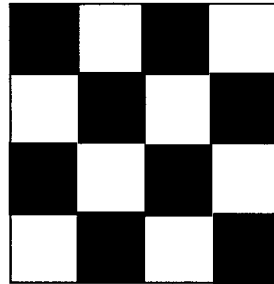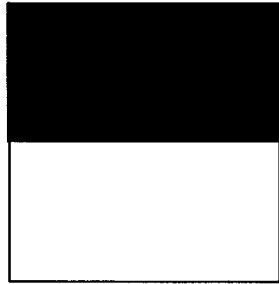
5. Consider a checkerboard image composed of alternating black and white squares, each of size m x m. Give a position operator that would yield a diagonal co-occurrence matrix. (10 points)

------- End of Exam --------

6. Under what conditions would you expect the major axis of a boundary to be equal to the eigen axes of that boundary? (5 points)

------- End of Exam --------