# COM1370, Summer 1998, Prof. Futrelle

Answer Notes for Final Exam, Monday, August 31st

This was a closed-book, closed-notes exam, two hours in length. Available on Prof. Futrelle's web site, http://www.ccs.neu.edu/home/futrelle.

1. This question involves color lookup tables (CLUTs). Consider the two bit per pixel image on the left, with the values shown. The image is processed through CLUT1 to produce an output. Draw the 3x3 output array after lookup, blackening the 00 (black) pixels and leaving the 11 (white) pixels white. Then do the same showing what happens when the image is processed through CLUT2. **Answer:** For example, look up pixel 01 in memory as CLUT1 address 01. CLUT1 output for this is 00, which is black, so every pixel value 01 is mapped to black, and so forth.
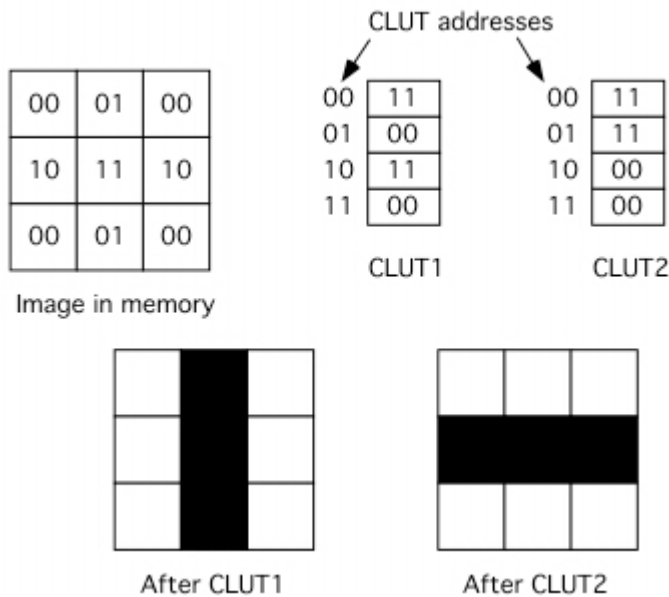
2. The picture below shows a small portion of an image of a fluttering flag, with a red (R) region to the lower right and a white (W) region to the upper left. Antialiasing is used to alter the output of pixels a through f to anti-alias the red-white boundary. Assume that the system uses 12 bit color, 4 bits for each of Red, Green, and Blue. Pure white (W) is represented by maximum intensity of each of the RGB components. Red is represented by the maximum intensity for the R component, zero for the other two. Estimate the 12 bit color value for each of the two pixels, b and d. Represent each of the two color values as 12 bit numbers, e.g.,

    0101 | 1101 | 0001   Show your calculations for the estimates.
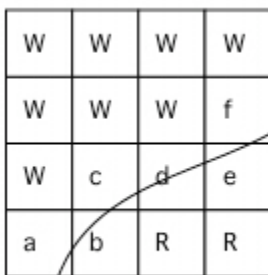
Answer: Red is 1111|0000|0000 and white is 1111|1111|1111. For the calculations we'll use decimal notation; each component has a max value of 15. Pixel b is about 80% red, 20% white, so taking a weighted sum of each component

gives R =15, G=3, B=3, or 1111|0011|011 in binary. Pixel d is about 55% red, 45% white, so a weighted sum gives R=15, G=8, B=8, or 1111|1000|1000 in binary.