

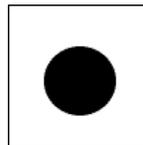
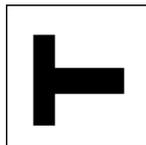
MATH 2590 - ASSIGNMENT 1

SEPTEMBER 21, 2010

- (1) Computers do all operations in base two on bits (a 0 or 1 value) and bytes (eight 0 or 1 values) and all of the operations that we want a computer to do on numbers must be done by first converting a number into its binary representation and then manipulating the binary representations with a few simple operations. For this first exercise you will need to learn the base 2 representation of a number.
 - (a) Find the remainder of your student id number when you divide it by 256 and convert this into binary.
 - (b) Divide the number from part (a) by 2 (round down if necessary) and convert it into binary.
 - (c) Multiply the number from part (a) by 4 and convert it into binary.
 - (d) In general, what is the minimum number of bytes that are required to represent a student id number at York? Why?
- (2) Black and white images are represented as a sequence of 0's (black) and 1's (white) and they are manipulated by programs which build up pictures like the following



with operations on bits. To do this exercise you need to learn what the operations of AND, OR, XOR, IMPL and NOT do on bits and what we will see is what they correspond to operations on pictures. The two binary pictures listed below are pic1 and pic2.



Draw by hand the following black and white images superimposed on each other.

Date: due Oct 5, 2010.

- (a) (pic1 AND pic2)
 - (b) (pic1 OR pic2)
 - (c) pic1 XOR pic2
 - (d) pic1 IMPL pic2
 - (e) (NOT pic1) AND (NOT pic2)
 - (f) (NOT pic1) XOR pic2
 - (g) NOT (pic1 IMPL pic2)
 - (h) (NOT pic1) IMPL (NOT pic2)
 - (i) pic1 AND (pic1 IMPL pic2)
- (3) In this exercise we will connect colors and numbers by graphing intensity of colors. For this exercise you will need to see the color version of these images. Go to your computer screen to view the images in this problem. Colors in a computer are generally represented by three bytes. Each pixel (a dot on a computer screen) has 3 bytes in memory: one for the red intensity, one for the blue intensity and one for the green intensity. The blue window in your 3d glasses filters out the intensity of the red and the green light and only the blue light arrives at your eye. Color spectrums like you find in drawing programs are usually formed with lines of colors where the intensity increases or decreases. Graph the position vs. intensity of the BLUE spectrum. (assume that the intensity changes given by straight lines). Note: if we had red and green glasses, it would be much easier to do the red and green spectrums as well. Estimate the intensity of the red and green spectrums by looking through the left eye of your glasses (again, assume that the intensity changes given by straight lines).

