BSysE530: Homework # 1

Due by mid-night Jan 23

Part 1: Matlab Practice

1. Create a 5x5 matrix A and perform activities as described from a to d.
    a. Delete the last row and last column
    b. Extract the first 3x3 matrix
    c. Replace the fourth row by zeros
    d. Replace the second and third values of the second row by ones
2. Plot a circle, a parabola, and a hyperbola in a figure. Label the axes, provide the title and draw the legend. Use a different line color and thickness for each plot.
3. Plot a 3D surface of a 2D Gaussian function
4. Read an RGB image using imread('filename.jpg') command and store the following information in a cell array
    a. Data Type – a string
    b. Number of cols – an unsigned integer
    c. Number of rows – an unsigned integer
    d. Pixel values of red channel
    e. Pixel values of green channel
    f. Pixel values of blue channel
5. Use a structure to solve problem # 4
6. Write a function to solve problem #5 that will return the structure to a calling function. Call the function from command window with a file name as a parameter.

Part 2: Binary Image Processing and Morphological Operators

1. Use a particular channel (out of R, G and B) and/or a combination of those to distinguish apples from leaf, tree, background and other objects. Image thresholding to get a binary image and a combination of erosion and dilation will be helpful in getting the footprint of apples. Final binary image will have zeros for pixels in apple surface and ones for everything else. Also, count the number of apples in each image using the binary image you have just derived. Images are available under 'images' folder in Angel.
    a. FakeApples.bmp
    b. Apples.jpg
    c. AuroraWall.jpg *(Extra Credit - 15% of this homework)*