# CSI 5325 Assignment 1

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Assigned: 1/16/2018; Due: 1/30/2018

## Instructions

For this assignment, you should write your derivations in LaTeX. They should be concise and easy to follow, with appropriate English descriptions rather than just mathematics (i.e. explain what you are doing as necessary).

Write any programs in Matlab (or Octave), and attach their code with your assignment. Include any relevant figures and graphs (plotted using Matlab / Octave) in your writeup.

Submit your assignment in two ways: hardcopy (in class) and by email (to hamerly@cs.baylor.edu, by the class start time on the due date). The email should have subject "CSI 5325 Assignment XX", and contain a single attachment as a ZIP file. It should be named "lastname-XX.zip", where lastname is your last name, and XX is the number of the assignment.

Finally, please keep your submitted email attachments small. In particular, make sure you are only submitting things that are necessary (omit datasets I gave you, compiled programs, etc.). Also, try to keep your graphics small by using vector (rather than bitmap) formats (e.g. PDF or EPS rather than JPG or BMP). Vector graphics are generally smaller in size and better quality than bitmap.

## Online exercises

- (10 points) Do the problem 'Perceptron Learning Algorithm' on Kattis. Try to get a high accuracy score! You should not include your code in your printout (I will view it on Kattis). Since the data in the problem may not be separable, you may need a stopping condition to avoid looping infinitely.

## Learning From Data exercises

Do the following exercises from your textbook. Do not just give your answers; show your work (in LaTeX) and explain/analyze your results.

- (10 points) Problem 1.1 – Explore Bayes' Theorem (aka Bayes' Rule), a very important but simple result from probability theory. Define the events carefully (picking a bag; the first ball picked is black; etc.). Assume that each bag and each ball inside each bag is equally likely to be chosen, and choices are without replacement.
- (10 points) Problem 1.2 – Use Matlab or Octave or another plotting utility to create illustrations.

- (10 points) Problem 1.4 – Use Matlab, Octave, or another reasonable high-level language to do your experiments. Remember that the point is to use the experiments to illustrate and illuminate, not write a lot of code.
- (10 points) Problem 1.6 – It is instructive to do simulations to check your derivations.