Pattern Classification
Homework #2 (Computer Assignment)

You are given the following sample points in a 2-class problem:

S_1: (1,1), (1,-1), (4,5)
S_2: (2,2), (0,2), (2,3)

Plot them in 2-D feature space. As you can see, they are not linearly separable.

(a) Are they separable by a higher order polynomial discriminant function? If so, what order do you think is the minimum necessary to separate them (no need to prove. Just explain graphically)?

(b) Consider the case of a second polynomial discriminant function. Re-pose the problem of finding such a nonlinear discriminant function, as a problem of finding a linear discriminant function for a set of sample points of higher dimension. Give the sample points. Hint: Φ-machine

(c) Using a computer, verify your answers to (a) and (b) by solving for a discriminant function boundary for your linear classifier of part (b); if it doesn't solve, increase order of the polynomial and re-map it to a linear classifier. Very that your resulting boundary does indeed classify the sample points correctly. Hint:

  A. Use Perceptron.

  B. To plot the discriminant function, you need to use **solve** and **roots** functions in Matlab.

  C. To verify the correct classification, plot the boundary and samples in one plot.