Homework 2
(due Monday, Feb 10th 2014)

1. **Least squares implementation:** Implement and execute a least squares classifier on Fisher's Iris flower dataset (`http://en.wikipedia.org/wiki/Iris_flower_data_set`). The dataset contains 50 samples from each of the three classes (*setosa, virginica, versicolor*). For the choices of 10%, 30% and 50% as training data, run 10 random trials in each case. (For example, if you choose 10% for training, in each of the 10 trials, randomly pick 10% for training and the remainder for testing.) To document performance, evaluate and report the training and test set misclassification errors in each case (10%, 30% or 50% training data chosen and for each random trial). Document all choices including percentages of each class in each random trial. When training the classifier, use the modified equation 4.16 from Bishop, where the matrix $\tilde{X}^T\tilde{X} + \lambda I_{(D+1)}$ is positive definite:

$$\tilde{W} = \left(\tilde{X}^T\tilde{X} + \lambda I_{(D+1)}\right)^{-1}\tilde{X}^T T. \tag{1}$$

The free parameter λ can be chosen to balance training and test set errors and to improve generalization performance. Document your choice of λ in each case.
2. Bishop 4.1, 4.2.