Middle East Technical University
Electrical-Electronics Engineering Department

EE 583 Pattern Recognition
Homework 3

Using MATLAB, attempt the questions below:

1) Execute the **Train SVM Classifier** example at https://www.mathworks.com/help/stats/fitcsvm.html *step-by-step* via "Try This Example" option in your internet browser (or you may execute it in your local MATLAB software by using "View MATLAB Command"). For the utilized `fisheriris` data set, for all its features (out of 4) find the pair of features (e.g. feature pairs (1,2), (1,3), (1,4), (2,3),…) with minimum number of support vectors that discriminate *versicolor* from *setosa* class. Comment on the results.

2) Execute the **Cross-validate SVM** example at https://www.mathworks.com/help/stats/fitcsvm.html *step-by-step* via "Try This Example" option in your internet browser (or you may execute it in your local MATLAB software by using "View MATLAB Command"). Repeat this cross-validation scenario for `fisheriris` data set, while using its all 4 features to discriminate *versicolor* from *setosa* class. Repeat the cross-validation test for *Leave-one-out cross-validation* rather than default 10-folds. Compare the results.

3) Execute **Multi-class SVM** example at https://www.mathworks.com/help/stats/fitcsvm.html *step-by-step* via "Try This Example" option in your internet browser (or you may execute it in your local MATLAB software by using "View MATLAB Command"). Repeat this part for the features 1&2, *Sepal length and width* rather than the feature 3&4, *Petal length and width*. Show the support vectors on the plots. Comment on the discriminative properties of these features.

4) Execute **Optimize an SVM Classifier** example at https://www.mathworks.com/help/stats/optimize-an-svm-classifier-fit-using-bayesian-optimization.html *step-by-step* via "Try This Example" option in your internet browser (or you may execute it in your local MATLAB software by using "View MATLAB Command"). List which parameters of SVM can be utilized to optimize the overall performance.