Machine Learning **Universität Hamburg**
Spring 2024 Sören Laue

Exercise Sheet 6

Exercise 1

The polynomial kernel $k(x,y)$ of degree s is given by $(x^\top y + 1)^s$. Compute the corresponding mapping Φ for the case that the data points x are from $\mathbb{R}$.

Exercise 2

Show that if k_1 and k_2 are two kernels and $\alpha_1 > 0$ and $\alpha_2 > 0$ are two scalars, then $k = \alpha_1 k_1 + \alpha_2 k_2$ is also a kernel.

Exercise 3

Your task is to find a good non-linear classifier to predict well on three given data sets. You are given a training and a test set for each data set. Run grid search and cross-validation to find good regularization and kernel hyperparameters for each data set and use this to find a good predictor for each data set. What is the final training and test accuracy for each data set?

You are allowed (and also encouraged) to use scikit-learn for this exercise.

Please turn in your solutions by Thursday, May 30th.