

Homework 10
MATH 123 - Spring 2023
Tufts University, Department of Mathematics
Due: April 20, 2023

QUESTION 1

Let $\phi : \mathbb{R}^d \mapsto \mathbb{R}^D$. Consider a kernel $\mathcal{K}(x, y) = \langle \phi(x), \phi(y) \rangle$. Prove that for all $x, y \in \mathbb{R}^d$,

$$\|\phi(x) - \phi(y)\|_2 = \sqrt{\mathcal{K}(x, x) - 2\mathcal{K}(x, y) + \mathcal{K}(y, y)}$$

QUESTION 2

Download the data ‘HW11_KernelSVM’ and train a kernel SVM on the training data using the ‘fitsvm’ function for both the linear and Gaussian kernels. How does the model you learn generalize to the testing data for each of these methods?