Assignment 4

This assignment is due by the start of class on Tuesday, November 24.

1. Solve problem 6.16 (page 321) in the textbook


3. Solve problem 6.26 (page 323) in the textbook. Then, use the approximate formula of equation 4.153 to evaluate the predictive distribution in equation 6.76.

4. (15 pts) Solve problem 7.7 (page 357). Please give all the details of the derivation from primal to dual instead of using intermediate results quoted in text.

5. (15 pts, from Shawe-Taylor and Cristianini text page 89) A ball of radius $R$ centered at point $v$ is the set

\[ B_R(v) = \{ x : ||x - v||^2 \leq R^2 \}. \]

We are given a dataset $S = \{ x_1, \ldots, x_N \}$ (each $x_i$ is a point in Euclidean space) and want to find the ball of smallest radius that contains $S$.

Express this problem as an optimization problem, minimizing $R$ subject to the constraints, and then convert it to dual form. Notice in your solution that the dual form allows us to express the solution in terms of kernels.