ECE 901
Homework 3

1. Consider a classification problem with $\mathcal{X} = [0,1]^d$ and $\mathcal{Y} = \{0,1\}$. Let $\mathcal{F}$ denote the collection of all histogram classifiers $f : [0,1]^d \to \{0,1\}$ with M equal volume bins. Assume that $\min_{f \in \mathcal{F}} R(f) = 0$. For a certain $\epsilon > 0$ and $\delta > 0$, how many samples n are needed for an (ϵ, δ)-PAC bound?

2. Consider a classification problem with $\mathcal{X} = [0,1]^2$ and $\mathcal{Y} = \{0,1\}$. Let $\{v_j\}_{j=1}^K$ be a collection of K points uniformly spaced around the perimeter of the unit square. Let $\mathcal{F}$ denote the set of linear classifiers obtained by connecting any two points in $\{v_j\}$ with a line. Assume that $\min_{f \in \mathcal{F}} R(f) = 0$. Give a bound for the estimation error in terms of K and the number of training data n.