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 $f : [0, 1]^d \rightarrow \{0, 1\}$ 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 $(\epsilon, \delta)$-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 $n$. 