Quiz: Chapter 1+2 definitions

Definition 1. The *in-sample error* is defined to be

Definition 2. The *out-of-sample error* is defined to be

Definition 3. The true label function is defined to be

Definition 4. The *generalization error* of a hypothesis g is defined to be

Definition 5. Let $\mathbf{x}_1, ..., \mathbf{x}_N \in \mathcal{X}$. The *dichotomies* generated by a hypothesis class $\mathcal{H}$ on these points are defined by

Definition 6. The *growth function* for a hypothesis class $\mathcal{H}$ is defined to be

Definition 7. We say that a hypothesis class $\mathcal{H}$ can *shatter* a dataset $\mathbf{x}_1, ..., \mathbf{x}_N$ if any of the following equivalent statements are true:

Definition 8. The integer k is said to be a *break point* for hypothesis class $\mathcal{H}$ if

Definition 9. The Vapnik-Chervonenkis dimension (VC dimension) of a hypothesis class $\mathcal{H}$, denoted by $d_{\text{VC}}(\mathcal{H})$ or simply d_{VC}, is

Theorem 1 (VC generalization bound)**.** For any tolerance $\delta > 0$, we have that with probability at least $1 - \delta$,