Homework 3

MATH 591 Mathematics of Machine Learning
Fall 2019

due: 5pm Monday Nov 18th, submit on MyCourses

Homework based on Mohri Ch 3. **Refer to 2nd edition for correct exercises.**

1. *Rademacher Complexity* Mohri 3.2
2. *Rademacher Complexity* Mohri 3.7
3. *Rademacher Complexity* Mohri 3.8
4. *Rademacher Complexity* Mohri 3.11
5. *VC dimension* Mohri 3.13
6. *VC dimension* Mohri 3.15
7. *Rademacher Complexity* Suppose

$$\mathcal{H}^\epsilon = \{f : X \to Y, \text{ there is some } h \in \mathcal{H}^0 \text{ such that } \mathbb{P}[f(x) \neq h(x)] \leq \epsilon\}$$

Prove that $\mathfrak{R}_m(\mathcal{H}^\epsilon) \leq \tilde{\epsilon} + \mathfrak{R}_{(1-\tilde{\epsilon})m}(\mathcal{H}^0)$ where $\tilde{\epsilon} = \lceil \epsilon m \rceil / m$ (rounding to the nearest integer). Hint: use the definition of Rademacher complexity.