Statistics 592C, Problem Set 4

Wellner; 1/29/99

Reading: VdV&W, Section 2.5 and 2.6, pages 127 - 153.
Due: Wednesday, February 3, 1999

1. Suppose that $\mathcal{C}$ and $\mathcal{D}$ are two VC collections of subsets of $\mathcal{X}$. Show that $V(\mathcal{C} \cup \mathcal{D}) \leq V(\mathcal{C}) + V(\mathcal{C})$. (This quantifies (iii) of Lemma 2.6.17, VdV&W, page 147.)

2. Suppose that $\mathcal{C}$ is a VC class of sets in $\mathcal{Y}$, and ψ is a function mapping $\mathcal{X}$ into $\mathcal{Y}$, show that $V(\psi^{-1}(\mathcal{C})) \leq V(\mathcal{C})$ with equality if ψ is onto $\mathcal{Y}$. (This quantifies (v) of Lemma 2.6.17, VdV&W, page 147.)

3. Problem 2.6.14, VdV & W page 152, the hyperplanes part.