Math 567
Winter 2009
Carl Miller

Problem set #1

Due date: Wednesday, January 28th.

1. Suppose that we have a binary symmetric channel in which the probability of a bit-error is $p = 0.02$. Suppose that a message of length 20 is sent across the channel. What's the probability that more than one error occurs?

2. Let n be an integer greater than 1. Suppose that $C \subseteq \{0,1\}^n$ is a subset in which the Hamming distance between any two elements is ≥ 2. Prove that $|C| \leq 2^{n-1}$. Prove that equality is possible (for any n).

3. Find a 4-element subset $S \subseteq \{0,1\}^5$ such that the Hamming distance between any two elements is at least 3.