EE 359 - Wireless Communications - Fall 2003

Homework 5: Due Tuesday 11/4 at noon (no late HWs).

1. (15 points) Consider a fading channel with BPSK modulation, 3 branch diversity with MRC, where each branch experiences independent fading with an average received SNR of 15 dB. Compute the average BER of this channel for Rayleigh fading and for Nakagami fading with $m = 2$ (Using the alternate Q function representation greatly simplifies this computation, at least for Nakagami fading).

2. (15 points) Consider a diversity systems with i.i.d. Rayleigh fading on each antenna branch. Assume each branch has an average SNR of $\overline{\gamma}$. Plot the outage probability (in log scale, i.e. $\log_{10} P_{out}$) for DPSK modulation with a target BER of 10^{-6} for 3-branch SC and MRC diversity for $\overline{\gamma}$ ranging from 0 to 20 dB. What is the power gain in dB of MRC over SC at $P_{out} = .01$?

3. (20 points) Plot the average probability of error as a function of branch SNR for a two branch MRC system with BPSK modulation, where the first branch has Rayleigh fading and the second branch has Nakagami-m fading with m=2. Assume the two branches have the same average SNR, and your plots should have that average branch SNR ranging from 5 to 20 dB.