ECE 534: SPRING 2017
HOMEWORK II
ISSUED: FEBRUARY 10TH. DUE FEBRUARY 20TH.

- **Problem 1.** Let $\{a_n\}$ be a sequence of real numbers. We may also claim that $\{a_n\}$ is a sequence of constant (degenerate) random variables. Let a be a real number. Show that the convergence of the sequence a_n to a is equivalent to convergence of the corresponding degenerate random variables to the same limit in probability.
- **Problem 2.** Let W_n denote a random variable with mean μ and variance b/n^p, where $p > 0$, μ, and b are constants independent on n. Prove that W_n converges in probability to μ.
- **Problem 3.** Prove that almost sure convergence of a sequence of random variables X_n, $n = 1, 2, \ldots$ to a constant μ is equivalent to the requirement that for every $\epsilon > 0$,
$$\lim_{n\to\infty} P\{\sup_{k>n} |X_k - \mu| \geqslant \epsilon\} = 0.$$
Also, show that
$$\sum_{n=1}^{\infty} P\{|X_n - \mu| \geqslant \epsilon\} < \infty$$
implies almost sure convergence.
- **Problem 4.** Problems 2.11, 2.13, 2.15, 2.19 from the text.