Homework Set 11 **EECS 401** **Due: Friday, April 14**

Things to practice: working with random processes, mean functions, autocorrelation functions, stationarity, wide sense stationariy

Readings in random processes: Sections 6.1-6.5, except you may skip: multiple random processes on pp. 337,338, the Wiener process and Brownian motion on pp. 354-356, cyclostationary processes on pp. 363-366.

1. 6.14, p. 391

2. 6.15, p. 391

3. 6.16, a, p. 391,

4. 6.24, a,b p. 392 Notes: X_n's are a Bernoulli random process. Skip the question: "Is the sample mean meaningful ...?"

5. 6.31, p. 393

6. 6.53, p. 395

7. 6.57, p. 396 (The "independence" of random processes X(t) and Y(t) means that every finite collection of X random variables are independent of every finite collection of Y random variables.)

8. Suppose $\{X_t\}$ is a wide sense stationary, continuous-time Gaussian random process with mean zero and autocorrelation function $R_X(\tau) = e^{-|\tau|}$.

   (a) Find the probability that $|X(2) - X(5)| \leq 2$.
   (Hint: Find the density of the random variable $Y = X(2) - X(5)$. Make good use of the fact that X(2) and X(5) are jointly Gaussian.)

   (b) Find the covariance matrix for the random variables X(t), X(t+1), X(t+2).

Other good problems: 6.17, 6.18, 6.19, 6.23, 6.25, 6.26, 6.32, 6.50, 6.51, 6.52, 6.55, 6.56, 6.58, 6.59, 6.66