

ECE 341: Probability and Random Processes for Engineers, Spring 2012

Homework 5

Name:

Assigned: 02.08.2012

Due: 02.15.2012

Problem 1. A binary transmission system send a “0” bit by transmitting a $-v$ voltage signal, and a “1” bit by transmitting a $+v$ voltage signal. The received signal is corrupted by Gaussian noise and given by:

$$Y = X + N$$

where X is the transmitted signal (either $+v$ or $-v$), and N is a noise voltage $\sim \mathcal{N}(0, \sigma^2)$. Assume that $P[\text{“1”}] = p = 1 - P[\text{“0”}]$. Find the pdf of Y .

Solution 1:

Problem 2. A factory has two spares of a critical system component that has an average lifetime of $1/\lambda = 1$ month. Find the probability that the three components (the operating one and the two spares) will last more than 6 months. Assume the component lifetimes are exponential random variables.

Solution 2:

Problem 3. Let $X \sim \mathcal{N}(\mu_x, \sigma_x^2)$. Find the pdf of $Y = aX + b$ for a, b known constants.

Solution 3:

Problem 4. Let X be the uniform random variable in the interval $[-2, 2]$. Find and plot $P[|X| > x]$.

Solution 4: