

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

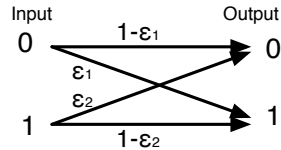
Homework 2

**Name:**

Assigned: 01.18.2012

Due: 01.25.2012

**Problem 1.** A nonsymmetric binary communication channel is shown in the figure below. Assume the input is “0” with probability  $p$  and “1” with probability  $1 - p$ .



- Find the probability that the output is 0
- We are given that the output is 1. Which input is more probable given this information?
- Set  $\epsilon_1 = \epsilon_2 = \epsilon$ . How what value of  $\epsilon$  are the inputs and outputs independent?

*Solution 1:*

**Problem 2.** Players X and Y roll dice alternatively starting with X. The player that rolls eleven wins. Show that the probability that player X wins is  $18/35$ . *HINT: Let  $A = \{\text{event that X wins}\}$ ,  $M = \{\text{eleven shows at first try}\}$ , and use  $P[A] = P[A|M]P[M] + P[A|M^c]P[M^c]$ .*

*Solution 2:*

**Problem 3.** A student needs eight chips of a certain type to build a circuit. It is known that 5% of these chips are defective. How many chips should he buy for there to be a greater than 90% probability of having enough chips for the circuit?

*Solution 3:*

**Problem 4.** Consider a well shuffled deck of 52 cards of which four are aces and four are kings.

- What is the probability of obtaining an ace in the 1st draw?
- Draw a card and look at it. Do not replace. What is the probability of drawing an ace in the 2nd draw? Does the answer change if you had not looked at the 1st draw?
- Suppose we draw 7 cards. What is the probability that the seven cards include three aces? That they include two kings?
- Suppose the entire deck of cards is distributed equally among four players. What is the probability that each player gets an ace?

*Solution 4:*