

## ECE 313 MW Homework 1

1. As we discussed in class, probability theory is concerned with the study of random (or chance) phenomena characterized by the fact that their future behavior is not predictable in a deterministic fashion. However, because certain statistical regularities, such phenomena are usually capable of simplified mathematical descriptions (e.g. characterized by mean, median, variance, etc) by constructing a model of the real-world situation. The theory of probability then allows us to predict or deduce patterns of future outcomes.

The purpose of this problem is to build on your intuitive notion of probability and to construct a simple model of a real world problem. Think about a realistic situation that you have encountered (it could be in the engineering, environmental, social, or political domain).

- a) Identify a simple model that represents or describes your "system" activities (by identifying one or two input variables, the functionality of the "system", and one or two output variables).
  - b) Draw a block diagram of your system (the system can have one or more blocks) with clearly identified inputs and outputs. Use the block diagram to characterize the probabilistic behavior of inputs, outputs, and the functionalities of the block(s). You could do this by defining appropriate parameter(s) for each and then associating probabilities if uncertainties exist.
  - c) How would you go about validating the accuracy of your model?
2. Describe a possible sample space for each of the following experiments (see pp. 25-30 in Ross for a description of sample spaces):
    - a) A computer's physical memory space can be divided into several fixed-sized pages. A small number of these pages can become corrupted (i.e., the pages contain incorrect data). Four pages are selected at random and examined to see whether each is corrupted or uncorrupted.
    - b) The following `for` loop is executed (`p` is a variable that can be either `TRUE` or `FALSE` each time through the loop, `A` and `B` are statements that can be executed):

```
for (int i = 0; i < 5; i++)
{
    if (p == TRUE)
        A;
    else
        B;
}
```