Lecture #18: Probability Distributions
What Will Happen During the Lecture

Remember... You Had Homework!

Students were asked to work through the following set of lecture notes before this lecture.

- Lecture Notes — "Probability Distributions".

As always, you may attend the lecture presentation if you have not worked through this material ahead of time — but it will not be repeated for you, and you might get a little bit lost, during the presentation, if you haven't worked through this.

Almost everything in the preparatory reading should review material that you already learned about in a prerequisite for this course. However, it is possible that (slightly) different terminology and notation is being used. Some of the results stated near the *end* of the reading might be results that you are learning about for the first time.

Problems To Be Solved

1. Discrete probability theory is used in *many* areas, including computer science, to examine situations where multiple things might happen, and where we wish to analyze the likelihood that something, related to this, is accomplished.

    - The set of "things that might happen" — that is, the set of possible ***outcomes*** — is modelled by a ***sample space***.

    It is almost always necessary to make an ***assumption*** about the likelihoods of outcomes, so that you calculate the likelihood of whatever it is that you are interested in.

    - The assumptions that are made, about the likelihood of outcomes, are modelled by the ***probability distribution*** that is used.

The related “thing”, that you are interested in, is then represented as an ***event***, whose probability you can try to compute.

Several problems involving various “situations” will be presented and solved, in order to gain practice modelling situations as sample spaces (and assumptions as probability distributions), and then calculating probabilities of events in order to solve whatever problem has been posed.

2. As noted above, discrete probability theory is used in *many* areas — including computer science. This often involves the use of one of the examples of experiments, and probability distributions, that were introduced in the preparatory reading — which are also included in *many* other introductions to discrete probability theory.

   In order to show an example of this, a simplified version of a data structure that is often included in an introduction to data structures (as covered in CPSC 331) — namely, a ***hash table with chaining*** — will be introduced. This will be compared to examples introduced in the preparatory reading in order to discover one that closely resembles the experiment that you would need to study when asking questions about a hash table with chaining.