STATS 1000S Quick Revision Guide

We can divide stats in two parts where section A is general statistics and section B is the Distributions.

Section A

1. House Advantage and Expected payout. Here you need to understand what house advantage is and try to work out examples in your assignment 1.
2. Basic probability calculations. For example; what is the probability of event happening on Monday in a week? Here you need to understand how to get probability over total events happening.
3. Sets: You are expected to understand various operations on sets. Operations such as intersections, union, compliments and the representations on diagrams.
4. Conditional probability. Here you need to know how to draw the table of conditional probability and the Bayes theorem which says P(A|B)=P(AnB)/P(B). The table looks like this:

A/B	B	$\overline{B}$
A	P(AnB)	P(An$\overline{B}$)
$\overline{A}$	P($\overline{A}$ nB)	P($\overline{A}$ n$\overline{B}$)
Total		

   Try to do some questions and revision from your Test 1 and some workshops questions.
5. Combinations and Permutations: On these two topics kindly consult your introstats. The examiner might expect you to use combinations formulas or Permutations formulas. NO FORMULAS GIVEN IN EXAM. Kindly understand the formulas for your own good.
6. Probability density Function (PDF) and Probability Mass function (PMF). The formulas of these two are so useful. In each case know their properties. Random variables: How to get expected variables (Mean) and variance. Like how do you get mean if given a PDF or PMF. How do you get variance given pdf or PMF.
   Consult Introstats Page 94-99 and do yourself a favour and do some examples there.
   NB: Probability density Function (PDF) and Probability Mass function (PMF). Are very useful to introduce you to Probability distributions. Kindly do yourself a favour by understanding these two very well.

Section B

We did cover 8 probability distributions namely Uniform, Binomial, Poissons, Exponential, Standard Normal, T-distribution, Paired T-test, Chi-squared(Association and goodness of Fit) and Regression.

Binomial and Uniform Distribution

By definition Introstats (Pg 319 and 321).

Just a recap: Binomial looks at **Discrete Data** and Uniform looks at **continuous** random variable.

Binomial takes a PMF (probability Mass Function) and Uniform takes a Probability density function.

The word at least three means; (P(X>=3)

The word at most three means (P(X<=3) meaning it is when X is 0,1,2,3

Some Questions:

1. A random variable M follows a Uniform distribution defined as M~U(10,70). What is the probability that X is less than 25? What is the expected mean value and variance of M. (Consult Introstats pg 319 and 321)
2. A certain type of pill is packed in bottles of 12 pills each. 10% of the pills are chipped in the manufacturing process. (a) Explain why the binomial distribution can provide a reasonable model for the random variable X, the number of chipped pills found in a bottle of 12 pills. What are the appropriate parameters? (b) What is the probability that a bottle of pills contains x chipped pills, i.e. what is Pr[X = x]? (c) What are the probabilities of (i) 2 chipped pills? (ii) no chipped pills? (iii) at least 2 chipped pills?
3. Beercans are randomly tossed alongside the national road, with an average frequency 3.2 per km. (a) What is the probability of seeing no beercans over a 5 km stretch? (b) What is the probability of seeing at least one beercan in 200 m? (c) Determine the values of x and y in the following statement: "40% of 1 km sections have x or fewer beercans, while 5% have more than y."
4. In each of 4 races, the Democrats have a 60% chance of winning. Assuming that the races are independent of each other, what is the probability that:

   a. The Democrats will win 0 races, 1 race, 2 races, 3 races, or all 4 races?

   b. The Democrats will win at least 1 race

   c. The Democrats will win a majority of the races
5. The current (in mA) measured in a piece of copper wire is known to follow a uniform distribution over the interval [0, 25]. Write down the formula for the probability density function f(x) of the random variable X representing the current. Calculate the mean and variance of the distribution and find the cumulative distribution function F(x).

Exponential and Poisons' Distribution

By definition Introstats (Pg 319 and 320).

Just a recap: Exponential looks at **Continuous Data** and Poisson's looks at **Discrete** random variable.

Poisson's takes a PMF (probability Mass Function) and Exponentia takes a Probability density function. They are defined by rate of random variable called lambda. X~P()) . λ