The final exam is in our classroom from 8–10am Tuesday 14 March.

Here are some sample questions, so that you have an idea of what to expect.

1. Explain what the following things are: sample space, population unit, addition law, qualitative data, uniform probability model, independence, random variable, normal distribution, statistic, central limit theorem.

2. Somebody measured something and collected the data:

$$3.0 \quad 4.2 \quad 5.1 \quad 3.5 \quad 0.1 \quad 4.2 \quad 5.5$$

   (a) Make a dot diagram.
   (b) Make a boxplot.
   (c) Using the intervals $[0, 1)$, $[1, 2)$, $[2, 3)$, $[3, 4)$, $[4, 5)$, and $[5, 6)$, make a histogram.
   (d) Compute the mean and standard deviation.

3. You roll two 3-sided dice and add the results.

   (a) Construct the probability distribution table.
   (b) Compute: $P\big([X = 2] \mid [X \text{ is even}]\big)$, $P[X \le 3]$, $P[X \ne 2]$, $P\big([X \le 2] \cup [X = 5]\big)$.
   (c) Suppose that you try this 10 times. What is the probability of getting 3 exactly six times?

4. (a) A certain drug test has a probability of .04 of indicating that a person uses heroin, when in fact they do not (a false positive). The same test has a probability of .06 of indicating that a person does not use heroin, when in fact they do (a false negative). It is known that 2% of college students use heroin. Suppose that a friend of yours here tests positive. What is the probability that they actually use heroin?

   (b) The bonding strength of a drop of plastic glue is normally distributed with mean 30 kilograms and standard deviation 3 kilograms. A broken plastic strip is repaired with a drop of this glue and then subjected to a test load of 28 kilograms. What is the probability that the bonding will fail?

x	$f(x)$
2	.2
3	.5
4	.3

5. The number of days, X, that it takes the post office to deliver a letter between Athens OH and Boulder CO is given by the probability distribution on the right.

   (a) Compute the expected value and standard deviation of X.
   (b) Suppose that during one year you sent 100 letters to Boulder, and noted the average time $\bar{X}$ it took to deliver them. Compute the expected value and standard deviation of $\bar{X}$.
   (c) Suppose that you send a letter to Boulder with a return receipt, which is then immediately mailed back to you. Find the probability distribution of the total number of days before you receive the receipt.