The third test is in class on Friday 17 February.

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

1. You are in a student organization. The president of the organization wants to raise money by selling raffle tickets for $1 each with the prizes and odds given in the table.

Prize	odds
$1000	1 in 2000
$100	1 in 200
$10	1 in 20

   Is this a good idea? Explain why or why not.

2. The three diseases G, H, and I can all produce a symptom of very strange green spots under the fingernails. It is known that about 0.001% of the population has G, 0.002% has H, and 0.003% has I. Seventy percent of people with G get the spots, as do 80% of the people with H, and 90% of the people with I. There has never been a case of someone having more than one these diseases at the same time, or of someone having these spots who does not have one of these diseases.

   (a) What percent of the total population has these spots?

   (b) Suppose that your friend has these spots. What is the probability that they have I?

3. You watch some kids playing a strange game.
   They have a die with three sides. One side is marked "2", another "3", and the third "4". They roll this die twice and multiply the results.

   (a) Identify the random variable X, and list all the elements in the sample space, **sorted into groups** according to the value that X takes on them.

   (b) Construct the probability distribution table **and** the probability histogram for X.

   (c) Compute:

       i. $P\big([X = 4] \,\big|\, [X \le 6]\big) =$
      ii. $E(X) =$
     iii. $sd(X) =$

4. You roll two ordinary (6-sided) dice.
   If the first die is less than the second die, then you consider this to be a success.

   (a) Convert this situation into a Bernoulli trial, and determine the value of $P(S) = p$.

   (b) Suppose that you try this 10 times.

       i. What is the expected number of successes?
      ii. What is the standard deviation of the number of successes?
     iii. What is the probability of having exactly 2 successes?
     iv. What is the probability of having at most 2 successes?