Discrete Mathematics and Probability
Tutorial 5

(1) Discuss your last tutorial/homework/class test with your peers.

(2) A telegraph sends out three symbols on the communication line. Represent
the following events in a single Venn diagram:

$$A_1 = \{\text{only the first symbol is received}\}$$
$$A_2 = \{\text{at least one symbol is received}\}$$
$$A_3 = \{\text{exactly two symbols are received}\}$$
$$A_4 = \{\text{less than two symbols are received}\}$$
$$A_5 = \{\text{exactly one symbol is received}\}$$

(3) Five cards are numbered as 1,2,3,4,5. Three cards are randomly selected
from the set and are lined up next to each other to form 3 digit number x.
Find the probabilities of the following events:
  (a) $A = \{x = 123\}$
  (b) $B = \{x \text{ does not contain the digit } 4\}$
  (c) $C = \{x \text{ is even}\}$
  (d) $D = \{x \text{ contains at least one of the digits } 1, 2\}$

(4) In how many ways can you order the elements of the set $\{1, 2, \ldots, 2n\}$ so
that every even number is at an even position?

(5) A white ball is thrown into an urn containing n balls. Next, a ball is drawn
at random from the urn. What is the probability that the selected ball is
white? The urn may initially contain $0, 1, 2, \ldots$ or n white balls, and it is
equally probable that the urn is in one of those $n + 1$ initial states at the
start of the experiment.