

Tutorial 5 Week 6

1. You have a deck of fifty-two cards.
 - (i) How many ways are there of choosing a hand of five cards?
 - (ii) How many of them contain the queen of hearts?
 - (iii) In how many ways can four hands of five cards each be given to four players, if we care which hand goes to which player?
 - (iv) In how many ways can four hands of five cards be selected from the deck? (This time we *don't* care which hand goes to which player.)

[Note that, as with all word problems, there is some chance of differing interpretations here. See the note on page ix of the text].
2. Consider the set $\{a, b, c, d, e, f\}$. How many ways are there of choosing four letters from this set
 - (i) if no letter is chosen twice?
 - (ii) if repetitions are allowed?
3.
 - (i) How many different outcomes are possible if seven identical dice are thrown? (An *outcome* is the collection of numbers, with repetition, visible on the top faces of the dice.)
 - (ii) Given a large supply of jelly beans of 10 different colours, how many ways are there to make up a bag of 5 jelly beans?
4. How many distinguishable arrangements are there of the letters in the words
 - (i) imperseverant,
 - (ii) myristicivorous,
 - (iii) indistinguishable,
 - (iv) sociological?
5. Suppose 20 people are divided into 6 different committees (labelled C_1 to C_6). Suppose that committee C_1 is to have 3 people, committee C_2 is to have 4 people, committee C_3 is to have 4 people, committee C_4 is to have 2 people, committee C_5 is to have 3 people and committee C_6 is to have 4 people. How many arrangements are there?
6. In how many ways can 15 distinct balls be placed in 4 boxes so that the first box contains 5 balls, the second box contains 3 balls, the third box contains 4 balls and the fourth box contains 3 balls?
7. Determine the coefficient of
 - (i) $x_1^2 x_2 x_3$ in $(x_1 + x_2 + x_3)^4$
 - (ii) $x_1^2 x_2^3 x_3^2$ in $(x_1 + x_2 + x_3)^7$.

Problem Set 5

1.
 - (i) How many words can be formed using all the letters of the word ANTIDISESTABLISHMENTARIANISM?
 - (ii) How many of the words in (i) have all the I's together?
 - (iii) Find the coefficient of $x_1^2 x_2^4 x_3^3 x_4^2$ in the expansion of $(x_1+x_2+x_3+x_4)^{11}$.
2. Suppose that there are 8 different kinds of doughnuts in a coffee shop.
 - (i) How many ways can you buy 5 doughnuts of different kinds?
 - (ii) How many ways can you buy 5 doughnuts?
3.
 - (i) In how many ways can we choose 4 novels and 3 biographies if there are 8 novels and 6 biographies from which to choose?
 - (ii) How many ways are there to choose 12 coins from a large supply of 10 cents, 20 cents, 50 cents and 1 dollar coins?
 - (iii) Find the coefficient of $x_1^2 x_2^3 x_3 x_4^4$ in the expansion of $(x_1+x_2+x_3+x_4)^{10}$
4.
 - (i) How many ways can the letters of the word HULLABALOO be arranged?
 - (ii) How many arrangements of the letters of HULLABALOO begin with U and end with L?
 - (iii) How many arrangements of the letters of HULLABALOO contain the two letters HU next to each other in order?
 - (iv) How many arrangements of the letters of HULLABALOO contain the two letters HU next to each other (in either order)?
5.
 - (i) How many ways of arranging six a 's and ten b 's with no consecutive a 's?
 - (ii) In how many ways can 8 identical pens be distributed among 4 students?
 - (iii) In how many ways can 8 identical pens be distributed among 4 students so that each student receives at least one pen?
 - (iv) In how many ways can 8 identical pens and 10 identical pencils be distributed among 4 students?
 - (v) In how many ways can 8 identical pens and 10 identical pencils be distributed among 4 students if each student receives at least 1 pen and 1 pencil?
 - (vi) Twelve students are awaiting enrolment in some courses (each student is to enrolled in just one course). If 3 of them are to be enrolled in Mathematics, 4 in Computer Science and 5 in Physics, in how many ways can the enrolment be made?