# Hibernia College Section 9 : Counting Methods and Probability

4.1 The basic counting methods

1. Illustrating a counting problem by a rooted tree
2. Using a multiplication Principle
3. How to distinguish between combinations and permutations
4. The number of permutations of length r
5. The number of combinations of length r objects chosen from a set of n distinct objects
6. Factorial notation
7. Deciding whether an ordered sequence or an ordered set is a correct type of answer to a counting problem
8. Counting

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The number of binary strings

(page 54)

Counting in which order is not important

Example 4.7

(page 5.8)

Example 4.8 Bill knows 4 children

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## 4.2 Counting using Sets

1. A U B = {0,1,2,3,4,5}
2. A U C = {1,2,3,4,5,6}
3. B U C = {0,3,4,5,6}

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Developing the principle of inclusion-exclusion

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## 4.3 Probability

* The sample space of an experiment
* The size of a sample space
* Some events and their probabilities

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We say that two events A and B of a sample space S are independent if they satisfy the equation P(A and B) =P(A)P(B)

Intuitively this means that the likelihood that one of the events occurs of not affected by the occurrence, or non-occurrence, by the other event.

Checking if two events are independent.

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Question 3 : A football club has 25 members. It needs to select a team of 11 players for a match, Describe the sample space.

In how many many ways can the team be chosen if

* All members are equally eligible for selection
* A given member has already selected as a captain and already has been included in the team.

Question 6: Find the number of integers between 1 and 1000 (both inclusive) that are not divisible by3,5 or 11.

2009 Zone A Question 8

Determine the number of different 3 digit strings using only digits from the set {1,2,3,4,5,6} where repetitions are allowed. How many of these strings will have all their digits distinct.

A deck of cards contains six cards numbered 1,2,3,4,5 and 6. An experiment is carried out in which three cards are chosen from this deck without replacement and the result is recorded as an ordered triple,such as (1,2,4) where this result is different from the result (2,4,1).

Let A be the event that the first card is even and B the event that the last card is a 6. Calculate the number of elements in each of the sets A , B AuB and AnB. Hence calculate this probabilities.

In an experiment a coin is tossed three times and each time it is noted

whether it comes up heads(H) or tails (T).

The final result is recorded as an ordered triple , such as (H,H,T).

Let A be the event that the last toss comes up as a heads and B

be the event that there is only one head in the triple.

i) Draw a rooted tree to model this process.

ii) Calculate the probabilities of the events A, B, A \cap B , A \cup B.

iii) Are A and B independent events? justify your answer.

In a class of 60 students, in how many ways can

i) a group of three students be chosen?

i) a first, second and third prize be awarded in a class competition if the student can recieve at most one prize.