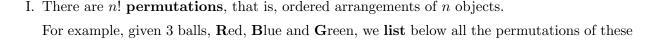
SchoolNova, Math 5b Homework 19 Permutations and Combinations April 7, 2019

Please provide sufficient details about how you solved the problem. More difficult problems are marked with a *. If unable to solve a problem, please present your thoughts and any partial solution.

A Combinatorics



balls: R B G

R G B

BRG

ВGR

GRB

GBR

So, there are 3! = 6 such permutations.

- II. There ${}^{n}C_{r} = \frac{n!}{r!(n-r)!}$ combinations, that is, number of different ways of selecting r objects out of n.
 - (a) A woman has 4 friends, Rebecca, Priyanka, Caroline and Jennifer. In how many ways can she invite 2 out of the 4 friends to a tea party?

We list here all the different combinations of 2 out of the 4 friends:

R P P C

R C P J

R J C J

With n=4 and r=2, there are ${}^4C_2=\frac{4!}{2!2!}=6$ ways of doing so.

(b) If two of her friends Caroline and Jennifer are feuding, in how many ways can she now invite 2 out of the 4 friends?

We now exclude the case C J from the list in (a). Therefore, there are a total of 5 such ways, as listed below:

R P P C

R C P J

RJ

III. A **partitioning** of n objects into 3 distinct groups of sizes r_1 , r_2 and r_3 , with $r_1 + r_2 + r_3 = n$ can be done in $\frac{n!}{r_1!r_2!r_3!}$ different ways.

B Assignment

Please provide sufficient details about how you solved the problem. More difficult problems are marked with a *. If unable to solve a problem, please present your thoughts and any partial solution.

- 1. You are given 4 balls: Red, Red, Blue and Green. The two red balls are alike. List all the permutations of these balls:
- 2. How many 3 digit odd numbers are there?
- 3. Pascal has 5 books, of which 3 are Mathematics and 2 are Physics. He arranges his books on the bookshelf such that all the books in the same subject are together. How many different arrangements are possible?
- 4. (a) The Mathematics department in a school has 4 mathematics teachers, **D**iophantus, **E**uclid, **H**ypatia, and **P**lato. 2 of these teachers will be teaching Geometry, 1 of them will be teaching Algebra and 1 will be teaching Probability. List all the different ways this can be done.
 - (b)* If there are a total of 7 mathematics teachers in the department, and 3 of these teachers are to teach Geometry, 2 are to teach Algebra and 2 are to teach Probability, in how many ways can this be done? Use the expressions given in A.
- 5. (a) 4 players P_1 , P_2 , P_3 and P_4 are to be divided into 2 teams of 2 each. Call the teams Team 1 and Team 2. List all the different ways this can be done.
 - (b)* 6 players are to be divided into 2 teams of 3 each. Call the teams Team 1 and Team 2. In how many ways can this be done? Use the expressions given in A.