Combinatorics Problem sheet

Question 1

How many numbers are there between 99 and 1000, having at least one of their digits 7?

Question 2

How many 5-digit telephone numbers can be constructed using the digits 0 to 9, if each number starts with 67 and no digit appears more than once?

Question 3

How many different ways can the letters of the word COMBINATORICS be arranged?

Question 4

In how many ways can you choose 4 candies from a jar of 6 different types of candies (let's say A, B, C, D, E, F) if each type of candy can be chosen multiple times?

Question 5

A committee of 3 persons is to be constituted from a group of 6 men and 4 women. In how many ways can this be done? How many of these committees would consist of 1 man and 2 women?

Question 6

Determine the number of 5 card combinations out of a deck of 52 cards, if there is exactly one ace in each combination.

Question 7

Expand the expression $(x + 2y)^4$ using the binomial theorem

Question 8

Suppose you have 10 pigeons and 9 pigeonholes. Prove that at least one pigeonhole must contain more than one pigeon.

Question 9

In a group of 100 students, 60 study Math, 45 study Physics, and 25 study both. How many students study either Math or Physics?

Question 10

How many distinct seating arrangements can be made for 7 people around a circular table if 3 of them are identical twins and 4 of them are distinct?