MATH221 Mathematics for Computer Science

Tutorial Sheet Week 9 - Autumn 2021

1. How many permutations of 3 items taken 5 at a time are there? How many permutations of 5 items taken 3 at a time are there?

2. A binary word is a word constructed from the alphabet $A = \{0, 1\}$. How many binary words of length 5 are there? How many of these words contain at least one 0 and at least one 1?

3. A *function* from a set A to a set B is a rule that assigns to each $a \in A$ an element denoted $f(a) \in B$. How many different functions from $\{a, b, c, d\}$ to $\{1, 2, 3\}$ are there?

4. In how many ways can a committee of 5 be chosen from 8 people?

5. Ten points are marked on the circumference of a circle.

(i) How many chords can be formed by joining them in all possible ways?

(ii) How many triangles can be formed by joining them in all possible ways?

(iii) How many hexagons can be formed by joining them in all possible ways?

6. Determine the size of the smallest set having at least 100 proper, nonempty subsets.

7. In how many ways can a selection of at least one book be made from 8 books?

8. Simplify $\sum_{r=0}^{13}(-1)^r\binom{13}{r}5^{13-r}$.

9. In a light bulb production factory, 12% of light bulbs were found to be faulty. If three light bulbs are tested, find the probability (as a decimal rounded to four places) that:

(a) all three are faulty

(b) none is faulty

(c) one is faulty.

10. A political candidate runs for two offices, A and B. The probability that the candidate wins A is 0.70, wins B is 0.60, and wins both is 0.35. What is the probability that the candidate wins at least one office?