Enumerative Combinatorics

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1 Advanced Topics in Enumeration

1.1 Set Partitions

In this section, we are interested in making Set partitions and their enumerations. For a finite set S that

$$|S| = m, S = \{1, 2, 3, ..., m\}$$

a partition of S is defined as collection of non - empty $A_j \subset S$ such that

$$A_i \cap A_j \neq \phi \text{ for all } i, j \tag{1}$$

$$A_1 \cup A_2 \cup A_3 \cdots \cup A_n = S \tag{2}$$

exercise) In how many ways can you make partition of $S = 1, 2, 3, 4$