De Morgan's Law

1. \((\bigcup_{i=1}^{n} E_i)^c = \bigcap_{i=1}^{n} E_i^c\)

Dual version of De Morgan's Law

\(\Rightarrow\) take the complement of both sides of 1

2. \((\bigcap_{i=1}^{n} E_i)^c = \bigcup_{i=1}^{n} E_i^c\)

Multinomial coefficient

Give the number of ways to group \(n\) objects into groups of \(n_1, n_2, \ldots, n_r\) objects, with \(n_1 + n_2 + \ldots + n_r = n\).

Compare with binomial coefficient:

\(n_1 = k\)
\(n_2 = n - k\).
Example 1: Prove that if \( E \cap F \), then \( F^c \cap E^c \).

Example 2:

Simplify \((E \cup F) \cap (E \cup F^c)\) using a Venn Diagram.

\[(E \cup F) \cap (E \cup F^c) = E.\]