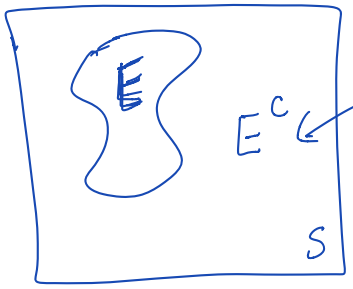
Theory of Probability

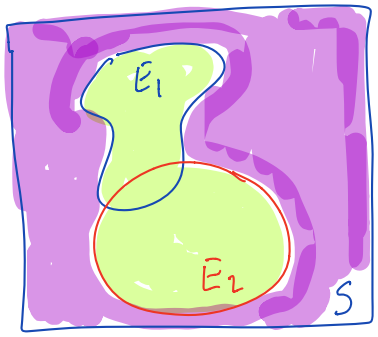
Sep 14, 2020

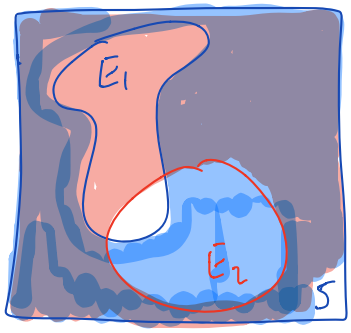
De Morgan's Law



"complement of E"
= collection of outcomes in S but not in E

(1) $$\left(\bigcup_{i=1}^{n} E_i\right)^c = \bigcap_{i=1}^{n} E_i^c$$





Dual version of DeMorgan's Law
⇒ take the complement of both sides of (1)

(2) $$\left(\bigcap_{i=1}^{n} E_i\right)^c = \bigcup_{i=1}^{n} E_i^c$$

Multinomial coefficient

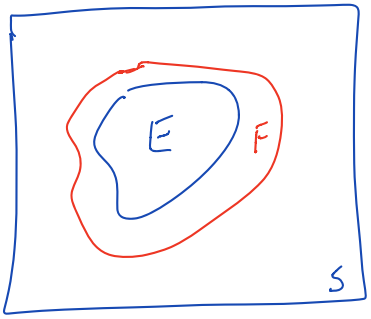
Gives the number of ways to group n objects into groups of $n_1, n_2, \ldots, n_r$ objects, with $n_1 + n_2 + \ldots + n_r = n$.

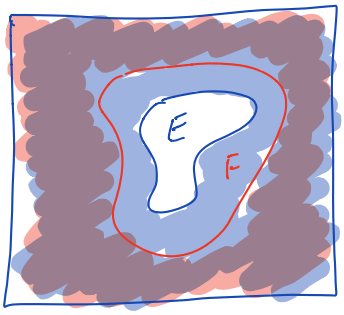
Compare with: binomial coefficients:

$n_1 = k$

$n_2 = n - k$.

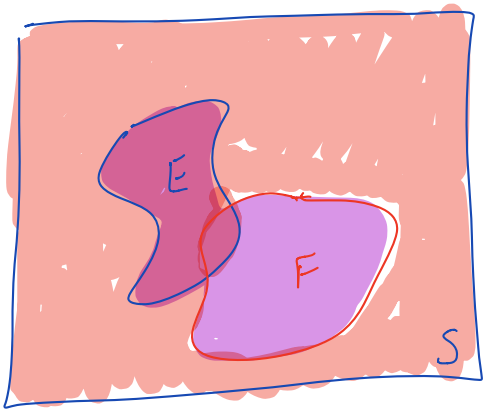
Example 1 Prove that if $E \subset F$, then $F^c \subset E^c$.

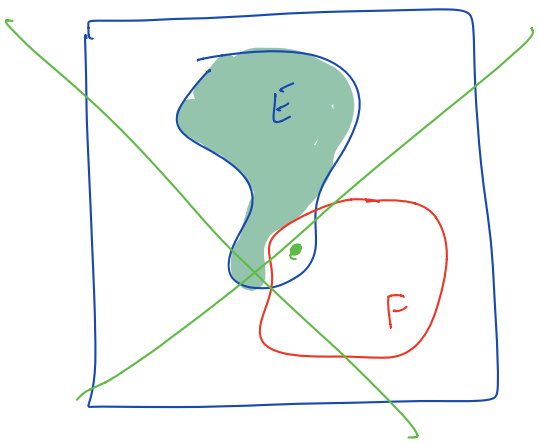




Example 2

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





$(E \cup F) \cap (E \cup F^c) = E.$