The UNIVERSITY *of* NORTH CAROLINA
at CHAPEL HILL

STOR 155 Introductory Statistics

Lecture 12: Birthday Problem, Prisoner Dilemma, Random Variable

RULES OF PROBABILITY

Rule 1. $0 \le P(A) \le 1$ for any event A

Rule 2. $P(S) = 1$

Rule 3. Addition rule: If A and B are **disjoint** events, then

$$P(A \text{ or } B) = P(A) + P(B)$$

Rule 4. Complement rule: For any event A,

$$P(A^c) = 1 - P(A)$$

Rule 5. Multiplication rule: If A and B are **independent** events, then

$$P(A \text{ and } B) = P(A)P(B)$$

Definition, pg 312a
Introduction to the Practice of Statistics, Fifth Edition

ADDITION RULE FOR DISJOINT EVENTS

If events A, B, and C are disjoint in the sense that no two have any outcomes in common, then

$$P(\text{one or more of } A, B, C) = P(A) + P(B) + P(C)$$

This rule extends to any number of disjoint events.

Definition, pg 313
Introduction to the Practice of Statistics, Fifth Edition

GENERAL ADDITION RULE FOR UNIONS OF TWO EVENTS

For any two events A and B,

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

Definition, pg 314
Introduction to the Practice of Statistics, Fifth Edition