**Chapter 3 Probability**

**OR EVENTS**

* An outcome is in the event A OR B
* if the outcome is in A or is in B or is in both A and B.

**AND EVENTS**

* An outcome is in the event A AND B if the outcome is in both A and B at the same time.

**COMPLEMENT EVENTS**

* The complement of event A is denoted A′ (read "A prime”).
* A ′ consists of all outcomes that are NOT in A.

**CONDITIONAL PROBABILITY**

* The conditional probability of A given B is written P(A|B).
* P(A|B) is the probability that event A will occur given that the event B has already occurred.
* A conditional reduces the sample space. We calculate the probability of A from the reduced sample space B. The formula to
* calculate P(A|B) is P(A|B) = $\frac{P(A and B)}{P(B)}$ where P(B) is not zero.
* **INDEPENDENT EVENTS**
* Two events are independent if the following are true:
* • P(A|B) =P(A)
* • P(B|A) =P(B)

• P(A AND B) =P(A)P(B)

**MUTUALLY EXCLUSIVE**

* A and B are **mutually exclusive** events if they cannot occur at the same time. This means that A and B do not share any outcomes and **P(A AND B) = 0.**

**THE MULTIPLICATION RULE “AND”**

* If A and B are two events defined on a sample space,
* then: P(A AND B) =P(B) P(A|B).
* This rule may also be written as: P(A|B) = $\frac{P(A and B)}{P(B)}$
* If A and B are i**ndependent**, then P(A|B) =P(A).
* Then P(A AND B) =P(A|B)P(B) becomes P(A AND B) =P(A)P(B).

**THE ADDITION RULE “OR”**

* If A and Bare defined on a sample space,
* then: P(A OR B) =P(A) +P(B) - P(A AND B).
* If A and B are **mutually exclusive**, then P(A AND B) = 0.
* Then P(A OR B)=P(A)+P(B)-P(A AND B)
* Becomes P(A OR B)=P(A) +P(B).