# Chapter 3 - Probability

## **1.** Definitions

- *Experiment* Any process of observation that leads to a single outcome that cannot be predicted with certainty.
- Sample Space Set of all possible outcomes.
- *Event* A subset of the sample space.
- Probability (of an event) The chance of this event occurring, under the Equally Likely Model (also known as the Uniform model), is given by

$$P(E) = \frac{\text{no. of favorable outcomes}}{\text{no. of possible outcomes}}$$

## **2.** Properties

- **a.**  $0 \le P(E) \le 1$ ; P(S) = 1; and  $P(\phi) = 0$
- **b.** Probability of the Complement:  $P(E^c) = 1 P(E)$
- **c.** Probability of the Union:

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

If A and B are *mutually exclusive(disjoint)* events (they don't intersect), then

$$P(A \cup B) = P(A) + P(B).$$

#### 3. Practice:

**a.** Suppose all 30 students in a class were asked for their preferences for fast food. The results obtained is given below

Gender	McDonalds	Taco Bell	Subway	Total
Male	2	6	10	
Female	3	2	7	
Total				

If a student is selected at random, what is the probability that

- i. the student prefers Taco Bell?
- ii. the student is a female?
- iii. the student does not prefer Subway?
- iv. the student prefer either McDonalds or Taco Bell?
- v. the student is female who prefers Subway?
- **b.** In a small town of 2000 people, there are 800 males, 700 of whom are employed. If a total 250 people are unemployed in this town, find the probability that a randomly selected person is
  - i. a male?
  - ii. an unemployed male?
  - iii. a female?
  - iv. an unemployed female?
  - v. male or employed?
  - vi. employed given his a male?

## 4. Homework.

Sec 3.2-3.4; (pp. 142-145) 40, 41, 43, 44, 45, 48, 52, 53.