

NOTES:

CHAPTER 12 PROBABILITY

1.

WHAT IS PROBABILITY?

Probability is a measure of the likelihood of a random phenomenon or chance behavior.

impossible very unlikely unlikely even chance likely very likely certain

0 $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ 1
impossible even chance certain

2. EXPERIMENT

In probability, an **experiment** is any process that can be repeated in which the results are uncertain.



SAMPLE SPACE

The **sample space, S**, of a probability experiment is the collection of all possible simple events. In other words, the sample space is a list of all possible outcomes of a probability experiment.



3. EVENT

An **event** is any collection of outcomes from a probability experiment. An event may consist of one or more simple events. Events are denoted using capital letters such as E .

4. PROBABILITY OF AN EVENT

The **probability of an event**, denoted $P(E)$, is the likelihood of that event occurring.

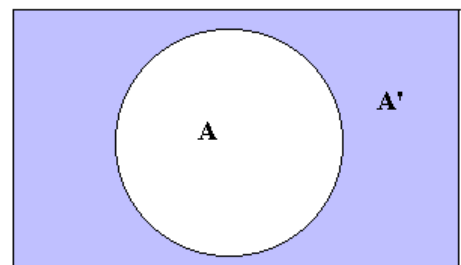
If an experiment has n equally likely simple events and if the number of ways that an event E can occur is m , then the probability of E , $P(E)$, is

$$P(E) = \frac{\text{number of times } E \text{ occurs}}{\text{number of elements in } S}$$

5. Complement of an Event

$$P(A) + P(A') = 1 \quad \text{or} \quad P(A') = 1 - P(A)$$

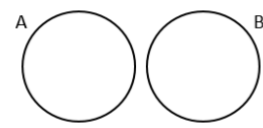
Note: Complement of A may be denoted as A' , A^c or \bar{A}



6. MUTUALLY EXCLUSIVE EVENTS

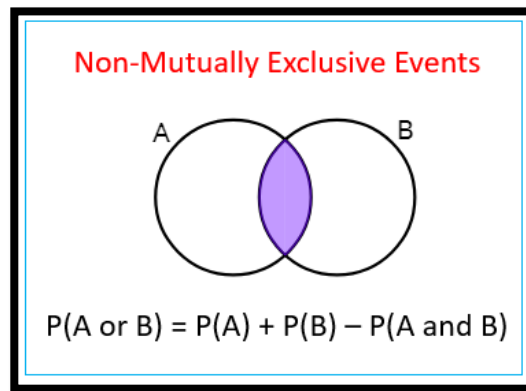
If events E and F have no simple events in common or **cannot occur simultaneously**, they are said to be **mutually exclusive**.

Mutually Exclusive Events



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

7. Non-Mutually Exclusive Events



8. PROBABILITY OF TWO INDEPENDENT EVENTS

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

↑ Probability of both events
 ↑ Probability of first event
 ↑ Probability of second event

9. Probability

A method of organizing data/events using tables that allows all possible results be clearly seen.

		First die					
		1	2	3	4	5	6
Second die	1	2	3	4	5	6	7
	2	3	4	5	6	7	8
	3	4	5	6	7	8	9
	4	5	6	7	8	9	10
	5	6	7	8	9	10	11
	6	7	8	9	10	11	12

10. The PROBABILITY TREE



The probability tree is the most useful diagram in calculating probabilities with combined events.

