Math AA HL Chapter 20 Probability

Probability:

$$P(Event) = \frac{n(E)}{n(S)} = \frac{\text{number of event occurances}}{\text{total number of possible outcomes}}$$

Remember: $0 \le P(A) \le 1$ (probability is always between 0 and 1, inclusive)

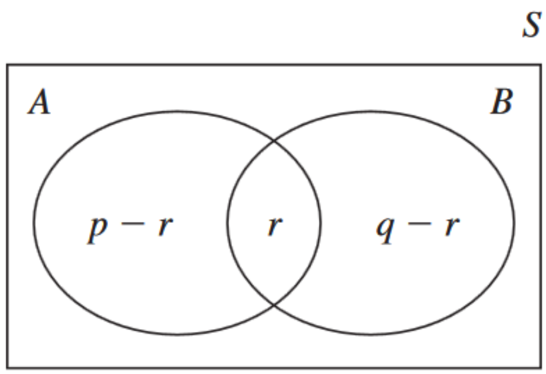
P(A) = 0 it will never happen

P(A) = 1 it will always happen

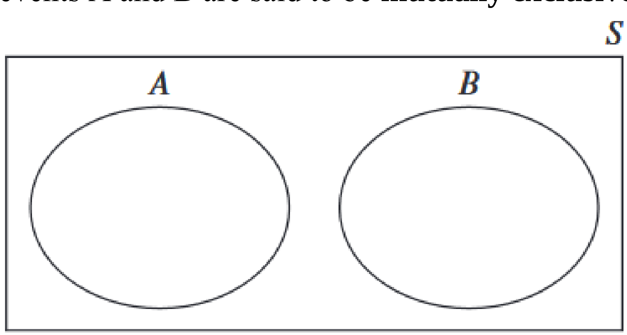
A′ is the complement of A

P(A) + P(A′) = 1

Set notation: P(A or B) = P(A) + P(B) – P(A and B) or $P(A \cup B) = P(A) + P(B) - P(A \cap B)$



If an event A can occur or an event B can occur but A and B cannot both occur, then the two events A and B are said to be **mutually exclusive**. In this case P(A and B) = $P(A \cap B) = 0$.

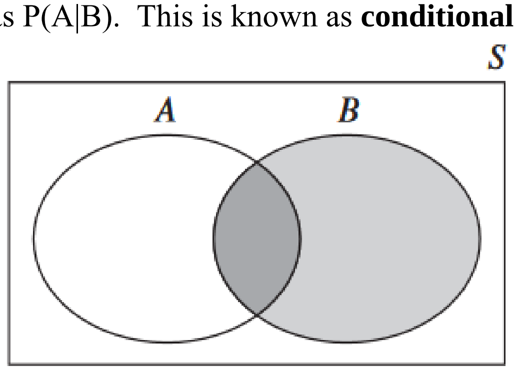


For mutually exclusive events

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

If two events A and B are such that $A \cup B = S$ where S is the total probability space, then and the events A and B are said to be **exhaustive**.

If A and B are two events, then the probability of A given that B has already occurred is written as P(A|B). This is known as **conditional probability**.

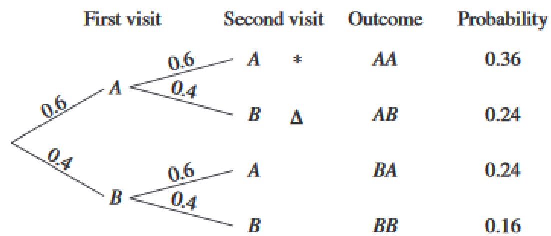


$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

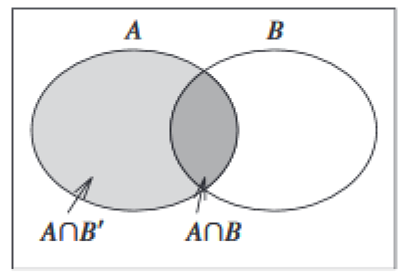
If the occurrence or non-occurrence of an event A does not influence in anyway the probability of an event B then the event B is said to be **independent** of event A. P(B|A) = P(B)

Check for independence:
P(A and B) = P(A) × P(B)

Tree diagram are useful with independent events.



Bayes' Theorem $P(B|A) = \dfrac{P(A|B) \times P(B)}{P(B)P(A|B) + P(B')P(A|B')}$



Use Bayes' Theorem when you are given P(A|B) and need P(B|A)

Combinations – choose items and the order does not matter

Permutations – choose items and the order does matter.