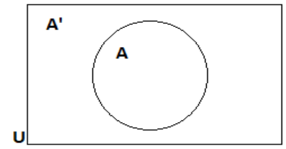
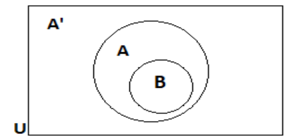
Venn diagram:

U: universal set.
A: subset of U. $A \subseteq U$
A’: subset of U not including A. A’ = U – A

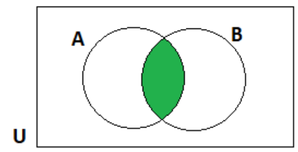


B subset of A, $B \subseteq A$:
all elements of B are in A, therefor:

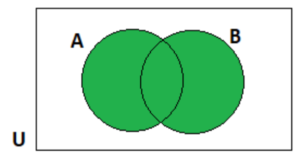
$$A \cup B = A$$



Intersection or overlap, $A \cap B$, (A AND B)

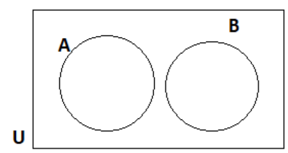


Union, or sum: $A \cup B$, (A OR B)



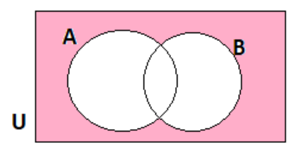
Mutually exclusive; no common element;

$$A \cap B = 0$$



De Morgan’s laws:

$$(A \cup B)' = A' \cap B'$$



De Morgan’s laws:

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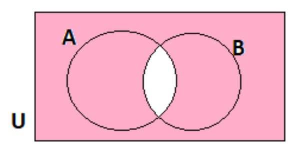

Rule: $A \cup B = A + B - A \cap B$, therefore: $A \cap B = A + B - A \cup B$

Continue in Page 2

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Probability:

Theoretical Probability is the ratio: P (A) = $\frac{N(A)}{N(U)} = \frac{Number\ of\ favorite\ outcomes}{Number\ of\ all\ possible\ outcomes}$

Complement (Probability of "not A" happening): P (A') $= 1 - P(A)$

Compound events probability: $P(A\ and\ B) =$ P (A) x P (B)

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

Important note: In logic "And" means multiply probabilities, "OR" means add probabilities.

Combined Probability:

Union: P (A ∪ B)

Intersection: P (A ∩ B)

Rule: P (A ∪ $B) = P(A\ or\ B)$ = P (A) + P (B) – P (A ∩ B)

Mutually exclusive events: P (A ∩ $B) = 0$ Then: P (A ∪ B) = P (A) + P (B)

Expected value or Expectancy: probability of an event out of n trials: E(x) = µ = n . P (x)

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

Independent probability: P (A ∩ B) $= P(A\ and\ B) =$ P (A) x P (B)

Bayes' Law: P (B | A) $= \frac{P\ (B)\ .\ P\ (A\ |\ B)}{P\ (B)\ .\ P\ (A\ |\ B) + P\ (B')\ .\ P\ (A\ |\ B')}$

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