# Reference Sheet

### Rules and Equations

#### Addition Rule

The likeleyhood that either event **and/or** occurs.

**Note:** if and are Disjoint then

#### Multiplication Rule

##### For independant Processes

**Note:** and must be two independant processes

##### General Rule

Note: This is for events that we believe are not independent, otherwise this is rearanged to the previous equation above

##### For Three Events

#### Complement Rule

For finding the probability of the complement of , since total probability should sum to one

#### Conditional Probability

The probability that occurs given has occured

$$P(A|B)={P(A\ and\ B) \over P(B)},\ \ \ P(B)\neq 0$$

#### Law of Total Probability

Suppose a sample space is partitioned in 3 disjoint events . Then for any event

#### Sum of Conditional Probabilities

The sum of all conditional probabilitys should always equate to 1

#### Complement Rule for Conditional Probability

From equation above

#### Bayes’ Theorem

The events form a partition of the sample space if every sample point is in one and only one . That is:

and are pairwise disjoint, that is to say the intersection of all pairs where , is the empty set.

##### **To find**

1. Calculate
2. Then calculate using

$$P(B\_i|A)={P(A|B\_i)P(B\_i)\over P(A)}$$

#### Expectation of a Random Variable

The sum of each outcome multiplied by its coorresponding probability

#### Variability of Random Variables

##### Standard deviation

#### Linear Combinations of Random Variables

For two independant variables