**Colorado Technical University**

 **Course:** MATH366 – Probability and Statistics

#### Unit 5 Part 09 Readings: Combinatorics

**Conditional Probability**

The probability of an event happening, given that another event has already

occurred, and the first event has impacted the second event

You should have at least two events happening one after another to use conditional

probability

If the two events are unrelated and the probability of the second event is not affected

by the first event, then it is said to be independent

One event often changes the likelihood of another event happening

Notation: P(A|B) means: the probability of A given B

The formula: P(A|B) = $\frac{P(A and B) }{P(B)}$

 "B" is the first event that happens

 **Bayes’ Theorem**

P(A|B) =$\frac{P(B|A) P(A) }{P(B)}$

## Counting

## Fundamental Counting Principle - the number of ways a series of things can occur

**Sample space** - the set of all possible outcomes or results of an experiment or trial

## Combinatorics

## Permutations - an ordered arrangement of items such that:

 no item is used more than once

##  the items are selected from the same group

the order DOES make a difference

**n P r = **

## # of permutations of n things taken r at a time:

## Combinations - an ordered arrangement of items such that:

 no item is used more than once

##  the items are selected from the same group

**n C r = **

 the order MAKES NO DIFFERENCE

## # of combinations of n things taken r at a time: