***Lecture One***

***Section* 1.1 – The Binomial Theorem**

A binomial is a sum , where *a* and *b* represent numbers. If *n* is a positive integer, then a general formula for expanding  is given by the ***binomial theorem***.









The expansions of  for *n* = 2, 3, 4, and 5 have the following properties:

* There are *n* + 1 terms, the first being  and the last 
* The power of *a* decreases by 1 and the power of *b* increases by 1. For each term, the sum of the exponents of *a* and *b* is *n*.
* Each term has the form , where the coefficient *c* is an integer and .
* The following formula is true for each of the first *n* terms of the expansion:



**Coefficient of the  Term in the Expansion of **



***Factorial Notation***

***Definition of n*! (*n* factorial)**

***Calculators*: *Math → Prob*** → 4

***Illustration***

1! = 1

2! = 2.1 = 2

3! = 3.2.1 = 6

4! = 4.3.2.1 = 24

***Example***

Simplify the quotient of factorial: 

***Solution***



**Coefficient of the  Term in the Expansion of  (*Alternative Form*)**



***Example***

Find 

***Solution***











***Binomial Theorem***







***Example***

Find the binomial expansion of 

***Solution***







***Pascal’s Triangle***



***Example***

Find the eighth row of the Pascal’s triangle, and use it to expand 

***Solution***





***Example***

Find the binomial expansion of 

***Solution***





***Exercises*** ***Section* 1.1 – The Binomial Theorem**

1. Find the *fifth* term in the expansion 
2. Find the term involving  in the binomial expansion 

Expand and simplify:

|  |  |  |
| --- | --- | --- |
|  |  |  |