

Grade 12 Math of Data Management

MDM4U

Qinghao Hu

December 8, 2025

Contents

1	Probability Distributions	2
1.1	Probability Distributions	3
1.1.1	Definitions for Probability Distributions	3
1.2	Uniform Distributions	4
1.2.1	Different Distributions	4
1.2.2	Characteristics of Uniform Distribution	4
1.3	Binomial Distributions	6
1.3.1	Example	6
1.3.2	Definitions	7
1.4	Geometric Distributions	8
1.4.1	Example	8
1.4.2	Definitions	8
1.5	Hypergeometric Distributions	9
1.5.1	Example	9
1.5.2	Definitions	9
2	Normal Distribution	10
2.1	Approximate Binomial	11
2.2	Approximate Hypergeometric	12

Chapter 2

Normal Distribution

2.1 Approximate Binomial

At certain situation, we can use a normal distribution to approximate a Binomial distribution

Theorem 2.1.1

If X is a binomial random distribution of n independent trials, each with probability of success p , and if

$$\begin{aligned} np &> 5 \\ n(1 - p) &> 5 \end{aligned}$$

then the binomial random variable can be approximated by a normal distribution with

$$\begin{aligned} \mu &= np \\ \sigma &= \sqrt{np(1 - p)} \end{aligned}$$

2.2 Approximate Hypergeometric

If the population size N is fairly large, and the sample size is relatively small, we can use a Normal Distribution to simulate Hypergeometric

Theorem 2.2.1

If X is a hypergeometric random distribution of n independent trials, each with probability of success p , and if

$$\begin{aligned}\frac{n}{N} &< \frac{1}{10} \\ n(1-p) &> 5\end{aligned}$$

then the binomial random variable can be approximated by a normal distribution with

$$\begin{aligned}\mu &= np \\ \sigma &= \sqrt{np(1-p)}\end{aligned}$$