

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	Binnomial 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	Confidence Intervals	11

Chapter 2

Normal Distribution

2.1 Confidence Intervals

Theorem 2.1.1

Repeated sampling from a normally distributed population produces a normally distributed sample means. Hence, the probability of observing a single sample mean, \bar{x} , within $z\sigma_{\bar{x}}$ of $\mu_{\bar{x}}$ is $1 - \alpha$

As a result, we can get:

$$P(\mu_{\bar{x}} - z\sigma_{\bar{x}} < x < \mu_{\bar{x}} + z\sigma_{\bar{x}}) = 1 - \alpha$$

After rearrange, for a significance level of α , we can get this:

$$\bar{x} - z\frac{\sigma}{\sqrt{n}} < \mu_{\bar{x}} < \bar{x} + z\frac{\sigma}{\sqrt{n}}$$

Therefore, the boundaries for the interval estimate is $\bar{x} \pm z\frac{\sigma}{\sqrt{n}}$