

# Testing of Hypothesis - Large Sample mean Test

## Introduction

Hypothesis tests are used to make decisions or judgments about the value of a parameter, such as the population mean. There are two approaches for conducting a hypothesis test; the critical value approach and the P-value approach. Since a sample statistic is being used to make decisions or judgments about the value of a parameter it is possible that the decision reached is an error; there are two types of errors made when conducting a hypothesis test; Type I Error and Type II Error.

Test of significance of the difference between sample mean and population mean

$$z = \frac{\bar{X} - \mu}{\sigma / \sqrt{n}}$$

## Procedure:

- Import the data set
- Determine the critical value and sample statistic using R functions
- Conclude the problem using R functions

**Note:** Please make sure that the following package is already installed.

“TeachingDemos”

## Code and Results:

```
## R has a predefined dataset with the name "discoveries"
# To know more about the dataset type "?discoveries" in the console
Dis=discoveries
Dis

## Time Series:
## Start = 1860
## End = 1959
## Frequency = 1
## [1] 5 3 0 2 0 3 2 3 6 1 2 1 2 1 3 3 3 5 2 4 4 0 2
3 7
## [26] 12 3 10 9 2 3 7 7 2 3 3 6 2 4 3 5 2 2 4 0 4 2 5
2 3
## [51] 3 6 5 8 3 6 6 0 5 2 2 2 6 3 4 4 2 2 4 7 5 3 3
0 2
## [76] 2 2 1 3 4 2 2 1 1 1 2 1 4 4 3 2 1 4 1 1 1 0 0
2 0

# input the parameters
MeanDis=mean(Dis);MeanDis

## [1] 3.1

SDDis=sd(Dis);SDDis
```

```

## [1] 2.254065

mu=3
sd=1
n=length(Dis);n

## [1] 100

library(TeachingDemos)

## Warning: package 'TeachingDemos' was built under R version 4.1.2

# compute the test of hypothesis
hyp=z.test(Dis,mu,sd)
hyp

##
## One Sample z-test
##
## data: Dis
## z = 1, n = 100.0, Std. Dev. = 1.0, Std. Dev. of the sample mean = 0.1,
## p-value = 0.3173
## alternative hypothesis: true mean is not equal to 3
## 95 percent confidence interval:
## 2.904004 3.295996
## sample estimates:
## mean of Dis
## 3.1

# test statistic
z=hyp$statistic
z

## z
## 1

#critical value
E=qnorm(.975);
E

## [1] 1.959964

#conclusion
if(z>E || z< -E){print("Reject null hypothesis")} else{print("Accept null
hypothesis")}

## [1] "Accept null hypothesis"

```