Experiment-7

Testing of hypothesis for one sample mean and proportion from real time problems

Aim: To understand the testing of hypothesis for large sample tests using R functions

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

Problem

Suppose the mean weight of King Penguins found in an Antarctic colony last year was 15.4 kg. In a sample of 35 penguins same time this year in the same colony, the mean penguin weight is 14.6 kg. Assume the population standard deviation is 2.5 kg. At 0 .05 significance level, can we reject the null hypothesis that the mean penguin weight does not differ from last year?

Codes and Results:

```
# Input the sample mean
xbar=14.6
xbar
```

```
## [1] 14.6
```

```
# Input the population mean
mu0=15.4
mu0
```

```
## [1] 15.4
```

```
# Input the standard deviation
sigma=2.5
sigma
```

```
## [1] 2.5
```

```
# Input the sample size
n=35
n
```

```
## [1] 35
```

```
# Test Statistic
z=(xbar-mu0)/(sigma/sqrt(n))
z
```

```
## [1] -1.893146
```

```
# Level of significance
alpha=0.05
alpha
```

```
## [1] 0.05
```

```
# Two-tailed critical value
zhalfalpha=qnorm(1-(alpha/2))
zhalfalpha
```

```
## [1] 1.959964
```

```
c(-zhalfalpha,zhalfalpha)
```

```
## [1] -1.959964  1.959964
```

```
# To find p-value
pval=2*pnorm(z)
pval
```

```
## [1] 0.05833852
```

```
# conclusion
if(pval>alpha){print("Accept Null hypothesis")} else{print("Reject Null
hypothesis")}
```

```
## [1] "Accept Null hypothesis"
```

Testing of Hypothesis - Large Sample proportion Test

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

$$z = \frac{p - P}{\sqrt{\frac{PQ}{n}}}$$

Procedure:

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

Problem:

The fatality rate of typhoid patients is believed to be 17.26%. In a certain year 640 patients suffering from typhoid were treated in a metropolitan hospital and only 63 patients died. Can you consider the hospital efficient?

Code and Results:

```
# Input the data
# Size of the sample
n=640
n
```

```
## [1] 640
```

```
# Sample proportion
Sprop=63/n
Sprop
```

```
## [1] 0.0984375
```

```
# Population proportion
Pprop=0.1726
Pprop
```

```
## [1] 0.1726
```

```
# probability of failure
q=1-Pprop
q
```

```
## [1] 0.8274
```

```
# test statistic
z=(Sprop-Pprop)/sqrt(Pprop*q/n)
z
```

```
## [1] -4.964736
```

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

```r
# critical region
c(-E,E)
```

```
## [1] -1.959964  1.959964
```

```r
# confidence interval
Sprop+c(-E,E)*sqrt(Pprop*(1-Pprop)/n)
```

```
## [1] 0.06915985 0.12771515
```

```r
# Conclusion
if(z>-E && z<E){print("Hospital is not efficient")} else{print("Hospital is
efficient")}
```

```
## [1] "Hospital is efficient"
```

Conclusion: Testing of hypothesis for large sample tests using R functions has been explored and concluded.