Experiment - 8

Testing of hypothesis for two sample means and proportion from real time problems

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

Testing of Hypothesis - Two Sample mean Test

Test of significance of the difference between two sample means

$$z = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{{\sigma_1}^2}{n_1} + \frac{{\sigma_2}^2}{n_2}}}$$

Procedure:

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

Problem

In a random sample of size 500, the mean is found to be 20. In another independent sample of size 400, the mean is 15. Could the samples have been drawn from the same population with S.D 4?

Codes and Results:

```
# Input the sample mean
xbar=20
xbar

## [1] 20

ybar=15
ybar

## [1] 15

# Input the standard deviation
sigma=4
sigma

## [1] 4
```

```r
# Input the sample size
n1=500
n1
```

```
## [1] 500
```

```r
n2=400
n2
```

```
## [1] 400
```

```r
# Test Statistic
z=(xbar-ybar)/(sigma*sqrt((1/n1)+(1/n2)))
z
```

```
## [1] 18.6339
```

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

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

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

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

```r
# conclusion
if(z<=zalpha){print("Accept Null hypothesis")} else{print("Reject Null
hypothesis")}
```

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

Testing of Hypothesis - Two Sample proportion Test

Test of significance of the difference between two sample proportions

$$z = \frac{p_1 - p_2}{\sqrt{PQ\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

Procedure:

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

Problem:

In a large city A, 20% of a random sample of 900 schools boys had a slight physical defect. In another large city B, 18.5% of a random sample of 1600 school boys had the same defect. Is the difference between the proportions significant?

Code and Results:

```
# Input the sample proportions
p1=0.20
p1
```

```
## [1] 0.2
```

```
p2=0.185
p2
```

```
## [1] 0.185
```

```
# Input the sample size
n1=900
n1
```

```
## [1] 900
```

```
n2=1600
n2
```

```
## [1] 1600
```

```
# To find approximate population proportion
P=(n1*p1+n2*p2)/(n1+n2)
P
```

```
## [1] 0.1904
```

```
Q=1-P
# Test Statistic
z=(p1-p2)/sqrt(P*Q*sqrt((1/n1)+(1/n2)))
z
```

```
## [1] 0.1871665
```

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

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

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

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

```r
# conclusion
if(z<=zalpha){print("Accept Null hypothesis")} else{print("Reject Null
hypothesis")}
```

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

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