

Session 9

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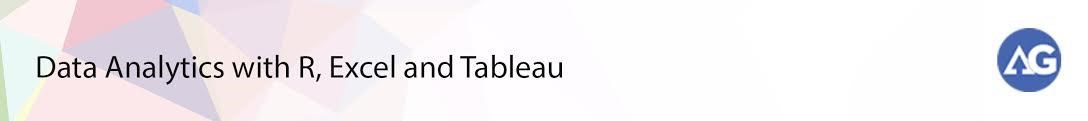
Statistical

Inference

Assignment

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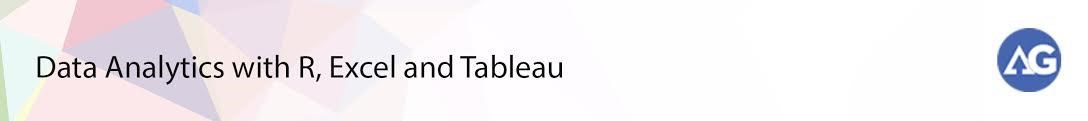
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**Introduction**

This assignment will help you to understand the key concepts learnt in this session.

# Objective

This assignment will test your skills on Theorems and Tests in R.

# Prerequisites

Not Applicable

# Associated Data Files

Not Applicable

# Problem Statement

1. If Z is norm (mean = 0, sd = 1)

Find P(Z > 2.64)

Ans- pnorm(2.64, lower.tail = FALSE) 0.004145301

Find P(|Z| > 1.39)

Ans- 2 \* pnorm(-1.39) 0.1645289

1. Suppose p = the proportion of students who are admitted to the graduate school of the University of California at Berkeley, and suppose that a public relation officer boasts that UCB has historically had a

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40% acceptance rate for its graduate school. Consider the data stored in the table UCBAdmissions from 1973. Assuming these observations constituted a simple random sample, are they consistent with the officerâ..s claim, or do they provide evidence that the acceptance rate was significantly less than 40%?

Use an Î± = 0.01 significance level.

Ans-Our null hypothesis in this problem is H0 : p = 0.4 and the alternative hypothesis is H1 : p < 0.4. We reject the null hypothesis if ˆp is too small, that is, if

pˆ − 0.4 /√ 0.4(1 − 0.4)/n < −zα,

where α = 0.01 and −z0.01 is

> -qnorm(0.99)

-2.326348

Our only remaining task is to find the value of the test statistic and see where it falls relative to the critical value. We can find the number of people admitted and not admitted to the UCB graduate school with the following.

> A <- as.data.frame(UCBAdmissions)

> head(A)

Admit Gender Dept Freq 1 Admitted Male A 512 2 Rejected Male A 313 3 Admitted Female A 89 4 Rejected Female A 19 5 Admitted Male B 353 6 Rejected Male B 207

> xtabs(Freq ~ Admit, data = A)

Admit Admitted Rejected 1755 2771 Now we calculate the value of the test statistic.

> phat <- 1755/(1755 + 2771) > (phat - 0.4)/sqrt(0.4 \* 0.6/(1755 + 2771)) -1.680919 Our test statistic is not less than −2.32, so it does not fall into the critical region. Therefore, we fail to reject the null hypothesis that the true proportion of students admitted to graduate school is less than 40% and say that the observed data are consistent with the officer’s claim at the α = 0.01 significance level.

# Expected Output

Not Applicable

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