



**ACADGILD**

# SESSION 9: Statistical Inference

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## Assignment 1

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## 1. Introduction

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

## 2. Objective

This assignment will test your skills on **theorems and tests** in R.

## 3. Prerequisites

Not applicable.

## 4. Associated Data Files

Not applicable.

## 5. Problem Statement

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

$P(Z > 2.64)$

**ANS:** `pnorm(-2.64, mean= 0, sd = 1)`

```
> pnorm(-2.64, mean= 0, sd = 1)
[1] 0.004145301
> |
```

**find  $P(|Z| > 1.39)$**

**ANS:**

```
#we can find by pnorm function too
pnorm(1.39)
#0.9177356
pnorm(-1.39)
#0.08226444
#1-(pnorm(1.39)-pnorm(-1.39))
#1-(0.9177356-0.08226444)
#1-0.8354712
#0.1645288 -ANSWER
```

2. 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 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 officer's claim, or do they provide evidence that the acceptance rate was significantly less than 40%? Use an  $\alpha = 0.01$  significance level.

**ANS:**

#to check for wheather there is consistency with the officers claim or do they provide evidence

#that the acceptance rate was significantly less than 40%

#thus defining the null hypo as  $H_0: p$  is equal to 0.40

#and  $H_a: p$  less than 0.40

# $H_0 : p = 0.4$

# $H_a : p < 0.4$

# $\alpha = 0.01$

#Thus to find we use `qnorm()` function

`-qnorm(0.99)`

**#-2.326348**

#Now to find out our test statistic

`newucb_data <- as.data.frame(UCBAdmissions)`

`View(newucb_data)`

`dim(newucb_data)`

`summary(newucb_data$Admit)`

`phat <- 12/(24)`

`t <- (phat-0.4)/sqrt(0.4*0.6/(24))`

`t`

#by calculations it is clear that our test statistic is not less than -2.326348

#So we accept our null hypothesis  $H_0$

#hence we say that the observed data are consistent with the officer's claim at  $\alpha = 0.01$  (Level of Significance)