ACADGILD ASSIGNMENT 9.1

SESSION 9: Statistical Inference

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

A)find P(Z > 2.64)

B)find P(|Z| > 1.39)

Answer:

A)P(Z>2.64)

pnorm(2.64, lower.tail = FALSE)

Output from R-conlose

```
 pnorm(2.64, lower.tail = FALSE)
[1] 0.004145301
```

B) P(|Z| > 1.39)

2 * pnorm(-1.39)

Output from R-conlose

```
2 * pnorm(-1.39)
[1] 0.1645289
```

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

Answer:

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 $\hat{p}$ is too small, that is, if $\hat{p} - 0.4 \sqrt{0.4(1 - 0.4)/n} < -z_\alpha,)$ where $\alpha = 0.01$ and $-z0.01$ is

qnorm(0.99)

A <- as.data.frame(UCBAdmissions)

head(A)

xtabs(Freq ~ Admit, data = A)

phat <- 1755/(1755 + 2771)

(phat - 0.4)/sqrt(0.4 * 0.6/(1755 + 2771))

```
> qnorm(0.99)
[1] 2.326348
> 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
> phat <- 1755/(1755 + 2771)
> (phat - 0.4)/sqrt(0.4 * 0.6/(1755 + 2771))
[1] -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 $\alpha = 0.01$ significance level

xyz   Untitled1*   Untitled1*

Source on Save   Run   Source   R Script

```r
1  qnorm(0.99)
2  A <- as.data.frame(UCBAdmissions)
3  head(A)
4  xtabs(Freq ~ Admit, data = A)
5  phat <- 1755/(1755 + 2771)
6  (phat - 0.4)/sqrt(0.4 * 0.6/(1755 + 2771))
7
```

7:1   (Top Level)

Environment   History   Connections

Import Dataset ▾   List ▾

Global Environment ▾

Data

A   24 obs. of 4 variables

RcmdrTestDrive   168 obs. of 9 variables

Values

phat   0.387759611135661

Y   num [1:2(1d)] 131 159

Files   Plots   Packages   Help   Viewer

Install   Update

Name   Description   Version

User Library

abind   Combine Multidimensional Arrays   1.4-5

acepack   ACE and AVAS for Selecting Multiple Regression   1.4.1
                  Transformations

aplpack   Another Plot Package: 'Bagplots', 'Iconplots',   1.3.2
                  'Summaryplots', Slider Functions and Others

arm   Data Analysis Using Regression and Multilevel/Hierarchical 1.10-1
                  Models

arules   Mining Association Rules and Frequent Itemsets   1.6-2

askpass   Safe Password Entry for R, Git, and SSH   1.1

assertthat   Easy Pre and Post Assertions   0.2.0

backports   Reimplementations of Functions Introduced Since R-3.0.0 1.1.3

base64enc   Tools for base64 encoding   0.1-3

BH   Boost C++ Header Files   1.69.0-1

bindr   Parametrized Active Bindings   0.1.1

bindrcpp   An 'Rcpp' Interface to Active Bindings   0.2.2

bitops   Bitwise Operations   1.0-6

callr   Call R from R   3.1.1

Console ~/

```
> 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
> phat <- 1755/(1755 + 2771)
> (phat - 0.4)/sqrt(0.4 * 0.6/(1755 + 2771))
[1] -1.680919
>
```