Practical 7

Hypothetical Testing

Ex.1. A random sample of 33 individuals who listen to talk radio was selected and the hours per week that each listens to talk radio was determined. The data are as follows.

9 8 7 4 8 6 8 8 7 10 8 10 6 7 7 8 9 6 5 8 5 6 8 7 8 5 5 8 7 6 6 4 5

Test the null hypothesis using R that $\mu = 5$ hours (h) versus the alternative hypothesis that $\mu \neq 5$ at level of significance $\alpha = 0.05$ in the following three equivalent ways:

(a) Compute the value of the test statistic and compare it with the critical value for $\alpha = 0.05$

(b) Compute the p-value corresponding to the computed test statistic and compare the p-value with $\alpha = 0.05$.

(c) Compute the $1 - \alpha = 0.95$ confidence interval for μ and determine whether 5 falls in this interval.

CODE:

```
x= c(9, 8, 7, 4, 8, 6, 8, 8, 7, 10, 8, 10, 6, 7, 7, 8, 9, 6, 5, 8, 5, 6, 8,
       7, 8, 5, 5, 8, 7, 6, 6, 4, 5)
mean(x)
sd(x)
mu= 5
xbar = mean(x)
s = sd(x)
n = 33
S.E.=  s/sqrt(n)
z = (xbar−mu)/(S.E.)
z
alpha = 0.05
z.half.alpha = qnorm(1−alpha/2)
A= z.half.alpha
c(−z.half.alpha, z.half.alpha)
CI=c(xbar-A*S.E. , xbar +A*S.E.)
CI
```

c(“ Since the value of test statistics z is not between the range (-1.959964, 1.959964), we reject the claim of the null hypothesis that there is not much significant difference at 0.05 significance level.”)

```
pvalue=2*pnorm(-abs(z))
pvalue
```

c(“This gives a value less than 0.05 so we reject the null hypothesis.”)

Ex.2. Test the significance of the difference between the means of two normal population with the same standard deviation from the following data:

	Size	Mean	SD
Sample I	100	64	6
Sample II	200	67	8

```
x1bar=64
x2bar=67
s1=6
s2=8
n1=100
n2=200
a=s1^2/n1
b=s2^2/n2
S.E.=sqrt(a+b)
S.E.
z = (x1bar−x2bar)/S.E.
z
alpha = 0.05
z.half.alpha = qnorm(1−alpha/2)
A= z.half.alpha
c(−z.half.alpha, z.half.alpha)
pvalue1=2*pnorm(-abs(z))
pvalue1
```

Ex. 3 An ambulance service claims that it takes on the average less than 10 minutes to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 minutes and the variance of 16 minutes. Test the claim at 0.05 level of significance.

```
mu=10
xbar = 11
s = 4
n = 36
S.E.=  s/sqrt(n)
z = (xbar−mu)/(S.E.)
z
alpha = 0.05
z.half.alpha = qnorm(1−alpha)
A= z.half.alpha
c(−z.half.alpha, z.half.alpha)
pvalue=pnorm(-abs(z))
pvalue
```