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**Registration No: 15BCE0531 EXPERIMENT 6**

Problem-1

> a= c(175,168,168,190,156,181,175,174,179)

> b= c(120,180,125,188,130,190,110,185,112,188)

> a= c(175,168,168,190,156,181,175,174,179,182)

> z.test(a,b,var.equal=FALSE,paired =FALSE)

Two Sample z-test data: a and b

t = 1.8827, df = 10.224, p-value = 0.08848

alternative hypothesis: true difference in means is not equal to 0 95 percent confidence interval:

-3.95955 47.95955

sample estimates: mean of x mean of y

174.8 152.8

> x= c(15,10,13,7,9,8,21,14,8)

> y=c(15,14,12,8,14,7,16,10,15,12)

> z.test(x,y,alt="less",var.equal= TRUE)

Two Sample z-test data: x and y

t = -0.3594, df = 17, p-value = 0.3619

alternative hypothesis: true difference in means is less than 0 95 percent confidence interval:

-Inf 2.432433

sample estimates: mean of x mean of y 11.66667 12.30000

Problem-2

> before=c(12.9,13.5,12.8,15.6,17.2,19.2,12.6,15.3,14.4,11.3)

> after=c(12.7,13.6,12.0,15.2,16.8,20.0,15.9,16.0,11.1)

> z.test(before,after,paired=TRUE)

Error in complete.cases(x, y) : not all arguments have the same length

> after=c(12.7,13.6,12.0,15.2,16.8,20.0,12.0,15.9,16.0,11.1)

> z.test(before,after,paired=TRUE) z-test

data: before and after

t = -0.2133, df = 9, p-value = 0.8358

alternative hypothesis: true difference in means is not equal to 0 95 percent confidence interval:

-0.5802549 0.4802549

sample estimates: mean of the differences

-0.05

PROBLEM-3

> before=c(12.9,13.5,12.8,15.6,17.2,19.2,12.6,15.3,14.4,11.3)

> after=c(12.7,13.6,12.0,15.2,16.8,20.0,12.0,15.9,16.0,11.1)

> z.test(before,after,paired=TRUE,alt="less") z-test

data: before and after

t = -0.2133, df = 9, p-value = 0.4179

alternative hypothesis: true difference in means is less than 0 95 percent confidence interval:

-Inf 0.3796859

sample estimates: mean of the differences

-0.05

> unit\_A= c(14.1, 10.1 ,14.7,13.7,14.0)

> unit\_B=c(14.0,14.5,13.7,12.7,14.1)

> var.test(unit\_A,unit\_B)

z test to compare two variances data: unit\_A and unit\_B

F = 7.3304, num df = 4, denom df = 4, p-value = 0.07954 alternative hypothesis: true ratio of variances is not equal to 1 95 percent confidence interval:

0.7632268 70.4053799

sample estimates: ratio of variances

7.330435

**Challenging Task**

1. A sample of 100 tires is taken from a lot. The mean life of tires is found to be

39, 350 kilo meters with a standard deviation of 3,260. Could the sample come

from a population with mean life of 40,000 kilometers?

Solution:

> n=100

> xbar=39350

> sigma=3260

> mu0=40000

> z=(xbar-mu0)/(sigma/sqrt(n))

> z

[1] -1.993865

> alpha=0.05

> z.alpha=qnorm(1-alpha)

> -z.alpha

[1] -1.644854

2. The mean life time of a sample of 400 fluorescent light bulbs produced by a

company is found to be 1,570 hours with a standard deviation of 150 hours.

Test the hypothesis that the mean life time of bulbs is 1600 hours against the

alternative hypothesis that it is greater than 1,600 hours at 1% and 5% level of

significance.

Solution:

> n=400

> mu0=1570

> sigma=150

> xbar=1600

> z=(xbar-mu0)/(sigma/sqrt(n))

> z

[1] 4

> alpha=0.05

> z.alpha=qnorm(1-alpha)

> z.alpha

[1] 1.644854

3. In the sample of 1000 people in Maharashtra, 540 are rice eaters and the rest are

wheat eaters. Can we assume that both rice and wheat are equally popular in

this state at 1% level of significance.

Solution:

> pbar=540/1000

> p0=0.5

> n=1000

> z=(pbar-p0)/sqrt(p0\*(1-p0)/n)

> z

[1] 2.529822

> alpha=0.05

> c(-z.half.alpha,z.half.alpha)

[1] -1.959964 1.959964

4. A particular brand of tires claims that its deluxe tire averages at least 50,000

miles before it needs to be replaced. From past studies of this tire, the standard

deviation is known to be 8000. A survey of owners of that tire design is

conducted. From the 28 tires surveyed, the average lifespan was 46,500 miles

with a standard deviation of 9800 miles. Do the data support the claim at the 5%

level?

Solution:

> x1bar=50000

> x2bar=46500

> sd1=8000

> sd2=9800

> z=(x1bar-x2bar)/sqrt((sd1\*sd1+sd2\*sd2)/28)

> z

[1] 1.463972

> alpha=0.05

> z.alpha=qnorm(1-alpha)

> z.alpha

[1] 1.644854

5. From generation to generation, the average age when smokers first start to

smoke varies. However, the standard deviation of that age remains constant of

around 2.1 years. A survey of 40 smokers of this generation was done to see if

the average starting age is at least 19. The sample average was 18.1 with a

sample standard deviation of 1.3. Do the data support the claim at the 5% level?

Solution:

> x1bar=19

> x2bar=18.1

> sd1=2.1

> sd2=1.3

> n=40

> z=(x1bar-x2bar)/sqrt((sd1\*sd1+sd2\*sd2)/n)

> z

[1] 2.304664

> alpha=0.05

> z.alpha=qnorm(1-alpha)

> z.alpha

[1] 1.644854

6. The cost of a daily newspaper varies from city to city. However, the variation

among prices remains steady with a standard deviation of 6¢. A study was done

to test the claim that the average cost of a daily newspaper is 35¢. Twelve costs

yield an average cost of 30¢ with a standard deviation of 4¢. Do the data support

the claim at the 1% level?

Solution**:**

> x1bar=35

> x2bar=30

> sd1=6

> sd2=4

> n=12

> z=(x1bar-x2bar)/sqrt((sd1\*sd1+sd2\*sd2)/n)

> z

[1] 2.401922

> alpha=0.01

> z.alpha=qnorm(1-alpha)

> z.alpha

[1] 2.326348

7. An article in the *San Jose Mercury News* stated that students in the California

state university system take an average of 4.5 years to finish their undergraduate

degrees. Suppose you believe that the average time is longer. You conduct a

survey of 49 students and obtain a sample mean of 5.1 with a sample standard

deviation of 1.2. Do the data support your claim at the 1% level?

Solution:

> xbar=4.5

> mu0=5.1

> sigma=1.2

> n=49

> z=(xbar-mu0)/(sigma/sqrt(n))

> z

[1] -3.5

> alpha=0.01

> z.alpha=qnorm(1-alpha)

> z.alpha

[1] 2.326348

9. In 1955, *Life Magazine* reported that the 25 year-old mother of three worked [on

average] an 80 hour week. Recently, many groups have been studying whether

or not the women's movement has, in fact, resulted in an increase in the average

work week for women (combining employment and at-home work). Suppose a

study was done to determine if the average work week has increased. 81 women

were surveyed with the following results. The sample average was 83; the

sample standard deviation was 10. Does it appear that the average work week

has increased for women at the 5% level?

Solution:

> -z.alpha

[1] -2.326348

> xbar=80

> mu0=81

> xbar=80

> mu0=83

> sigma=10

> n=81

> z=(xbar-mu0)/(sigma/sqrt(n))

> z

[1] -2.7

> alpha=0.05

> z.alpha=qnorm(1-alpha)

> -z.alpha

[1] -1.644854

10. Your statistics instructor claims that 60 percent of the students who take her

Elementary Statistics class go through life feeling more enriched. For some

reason that she can't quite figure out, most people don't believe her. You decide

to check this out on your own. You randomly survey 64 of her past Elementary

Statistics students and find that 34 feel more enriched as a result of her class.

Now, what do you think?

Solution:

> pbar=34/64

> p0=0.6

> n=64

> z=(pbar-p0)/sqrt(p0\*(1-p0)/n)

> z

[1] -1.122683

> alpha=0.05

> z.alpha=qnorm(1-alpha)

> -z.alpha

[1] -1.644854

11. According to an article in *Newsweek*, the natural ratio of girls to boys is 100:105.

In China, the birth ratio is 100: 114 (46.7% girls). Suppose you don’t believe the

reported figures of the percent of girls born in China. You conduct a study. In

this study, you count the number of girls and boys born in 150 randomly chosen

recent births. There are 60 girls and 90 boys born of the 150. Based on your

study, do you believe that the percent of girls born in China is 46.7?

> pbar=60/150

> p0=0.467

> n=150

> z=(pbar-p0)/sqrt(p0\*(1-p0)/n)

> z

[1] -1.644744

> alpha=0.05

> z.alpha=qnorm(1-alpha)

> -z.alpha

[1] -1.644854

12. A poll done for *Newsweek* found that 13% of Americans have seen or sensed the

presence of an angel. A contingent doubts that the percent is really that high. It

conducts its own survey. Out of 76 Americans surveyed, only 2 had seen or

sensed the presence of an angel. As a result of the contingent’s survey, would

you agree with the *Newsweek* poll? In complete sentences, also give three reasons

why the two polls might give different results.

Solution:

> pbar=2/76

> p0=0.13

> n=76

> z=(pbar-p0)/sqrt(p0\*(1-p0)/n)

> z

[1] -2.687745

> alpha=0.05

> z.alpha=qnorm(1-alpha)

> -z.alpha

[1] -1.644854