

**Q1. Experience has shown that 20 percent of a manufactured product is of top quality. In one day's production of 400 articles, only 50 are of top quality. Show that either the production of the day chosen was not a representative or the hypothesis of 20 percent was wrong.**

```
> P = 20/100

> Q = 1 - P

> x = 50

> n = 400

> p = x/n

> z = abs((p - P)/sqrt(P * Q / n))

> z

[1] 3.75

> Zalpha = abs(qnorm(0.05/2, lower.tail=FALSE))

> Zalpha

[1] 1.959964

> print('H0: Production of day is representative')

[1] "H0: Production of day is representative"

> print('H1: Production of day is not representative')

[1] "H1: Production of day is not representative"

>

> if(z < Zalpha) {
+ print("z < Zalpha")
+ print('H0 is accepted')
+ } else {
+ print("z > Zalpha")
+ print('H0 is rejected')
+ }

[1] "z > Zalpha"

[1] "H0 is rejected"
```

**Q2. In an analysis regarding the results in a University, out of a random sample of 1200 students, it was found that 800 were passed in the Examination. In another random sample of 1000 students of an affiliated college 800 students were passed. Find out whether the proportion of pass in the University is significantly greater than the affiliated college.**

```
> p1 = 800/1200
> p2 = 800/1000
> n1 = 1200
> n2 = 1000
>
> p = (n1*p1 + n2*p2) / (n1+n2)
> q = 1-p
>
> z = abs((p1-p2) / sqrt(p*q*(1/n1 + 1/n2)))
> z
[1] 6.992059
> Zalpha = abs(qnorm(0.05, lower.tail=FALSE))
> Zalpha
[1] 1.644854
>
> print('H0: No significant difference in proportion of pass')
[1] "H0: No significant difference in proportion of pass"
> print('H1: Proportion of pass in University significantly greater than that
in college')
[1] "H1: Proportion of pass in University significantly greater than that in
college"
>
> if(z < Zalpha) {
+ print("z < Zalpha")
+ print('H0 is accepted')
+ } else {
```

```
+ print("z > Zalpha")  
  
+ print('H0 is rejected')  
  
+ }
```

```
[1] "z > Zalpha"
```

```
[1] "H0 is rejected"
```

**Q3. In a college, 60 junior students are found to have a mean height of 171.5 cm and 50 senior students are found to have a mean height of 173.8 cm. Can we conclude, based on these data, that the juniors are shorter than seniors with the assumption that the standard deviation of students of the college is 6.2 cm? Use 1% level of significance.**

```
> n1 = 60
> m1 = 171.5
> n2 = 50
> m2 = 173.8
> sd = 6.2
> z = abs((m1 - m2)/sqrt(sd^2/n1 + sd^2/n2))
> z
[1] 1.937316
> Zalpha = abs(qnorm(0.01, lower.tail=FALSE))
> Zalpha
[1] 2.326348
> print('H0: No difference in heights')
[1] "H0: No difference in heights"
> print('H1: Juniors shorter than seniors')
[1] "H1: Juniors shorter than seniors"
> if(z < Zalpha) {
+ print("z < Zalpha")
+ print('H0 is accepted')
+ } else {
+ print("z > Zalpha")
+ print('H0 is rejected')
+ }
[1] "z < Zalpha"
[1] "H0 is accepted"
```

**Q4. Blood glucose levels for obese have a mean of 100 with a standard deviation of 15. A researcher thinks that a diet high in raw corn starch will have a positive or negative effect on blood glucose levels. A sample of 30 patients who have tried the raw corn starch diet have a mean glucose level of 140. Test the hypothesis that the raw corn starch had an effect at 95% confidence level.**

```
> pm = 100
> psd = 15
> sm = 140
> n = 30
> z = abs((sm-pm)*sqrt(n)/psd)
> z
[1] 14.60593
> Zalpha = abs(qnorm(0.05/2, lower.tail=FALSE))
> Zalpha
[1] 1.959964
> print('H0: Corn starch had no effect')
[1] "H0: Corn starch had no effect"
> print('H1: Corn starch had effect')
[1] "H1: Corn starch had effect"
> if(z < Zalpha) {
+ print("z < Zalpha")
+ print('H0 is accepted')
+ } else {
+ print("z > Zalpha")
+ print('H0 is rejected')
+ }
[1] "z > Zalpha"
[1] "H0 is rejected"
```

**Q5. The mean breaking strength of the cables supplied by a manufacturer is 1800 with a S.D of 100. By a new technique in the manufacturing process, it is claimed that the breaking strength of the cable has increased. In order to test this claim, a sample of 50 cables is tested and it is found that the mean breaking strength is 1850. Can we support the claim at 1% level of significance?**

```
> pm = 1800
> psd = 100
> sm = 1850
> n = 50
> z = abs((sm - pm)*sqrt(n)/psd)
> z
[1] 3.535534
> Zalpha = abs(qnorm(0.01, lower.tail=FALSE))
> Zalpha
[1] 2.326348
> print('H0: No change in strength')
[1] "H0: No change in strength"
> print('H1: Strength Increased')
[1] "H1: Strength Increased"
>
> if(z < Zalpha) {
+ print("z < Zalpha")
+ print('H0 is accepted')
+ } else {
+ print("z > Zalpha")
+ print('H0 is rejected')
+ }
[1] "z > Zalpha"
[1] "H0 is rejected"
```