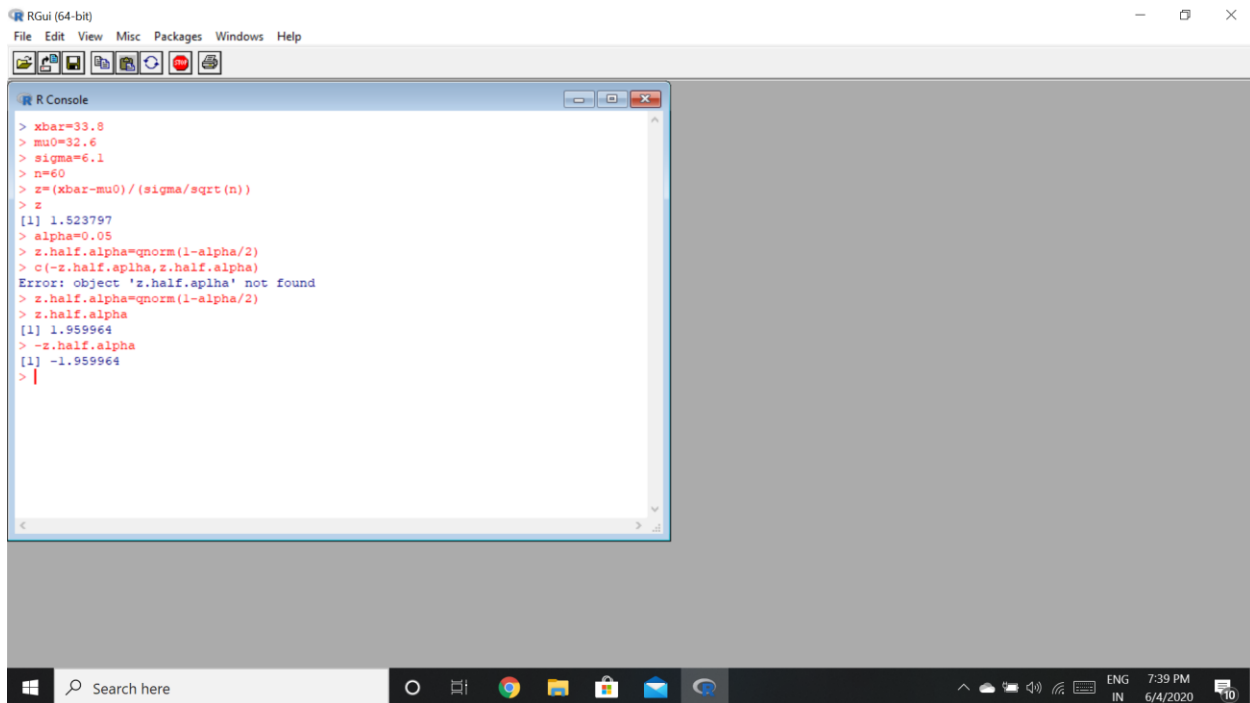


Statistics DA 4

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Q1. In a random sample of 60 workers, the average time taken by them to get to work is 33.8 minutes, with a standard deviation of 6.1 minutes. Can we reject the null hypothesis $\mu = 32.6$ minutes in favour of alternative hypothesis $\mu > 32.6$ minutes at tabulated value 2.58 ?



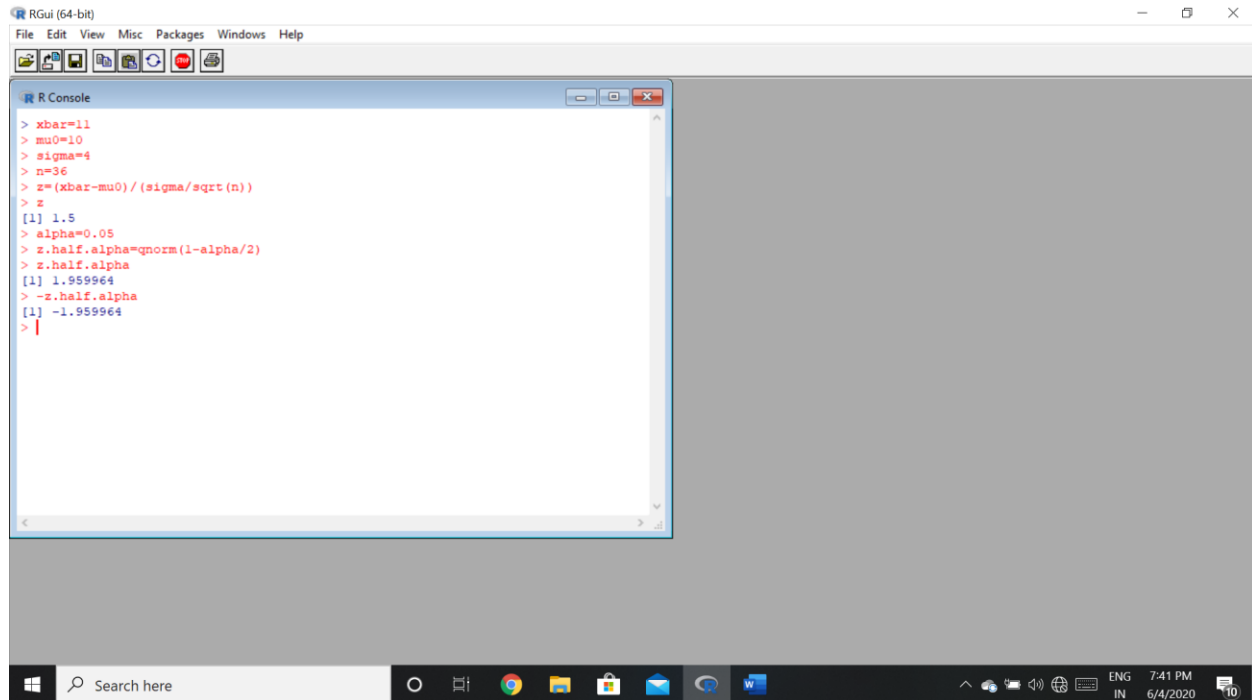
```
RGui (64-bit)
File Edit View Misc Packages Windows Help

R Console
> xbar=33.8
> mu0=32.6
> sigma=6.1
> n=60
> z=(xbar-mu0)/(sigma/sqrt(n))
> z
[1] 1.523797
> alpha=0.05
> z.half.alpha=qnorm(1-alpha/2)
> c(-z.half.alpha,z.half.alpha)
Error: object 'z.half.alpha' not found
> z.half.alpha=qnorm(1-alpha/2)
> z.half.alpha
[1] 1.959964
> -z.half.alpha
[1] -1.959964
>
```

Interpretation:

The test statistic 1.523797 lies between the critical values -1.959964 and 1.959964. Hence, at 5% significance level, we do not reject the null hypothesis

Q2. 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 significance at 5% level of significance.



The screenshot shows the RGui (64-bit) window. The R Console contains the following code and output:

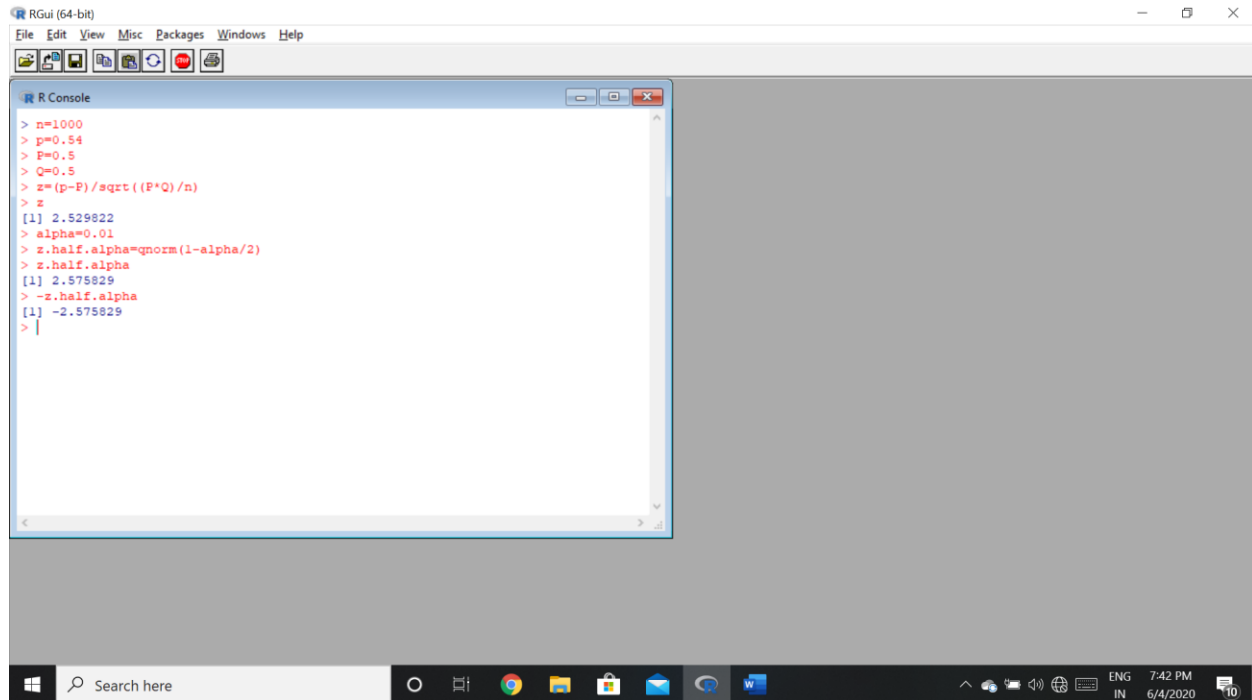
```
> xbar=11
> mu0=10
> sigma=4
> n=36
> z=(xbar-mu0)/(sigma/sqrt(n))
> z
[1] 1.5
> alpha=0.05
> z.half.alpha=qnorm(1-alpha/2)
> z.half.alpha
[1] 1.959964
> -z.half.alpha
[1] -1.959964
>
```

The Windows taskbar at the bottom shows the search bar, task view button, and several application icons. The system tray on the right indicates the language is ENG, the time is 7:41 PM, and the date is 6/4/2020.

Interpretation:

The test statistic 1.5 lies between the critical values -1.959964 and 1.959964. Hence, at 5% significance level, we do not reject the null hypothesis.

Q3. In a city, a sample of 1000 people were taken and out of them 540 are vegetarians and the rest are non-vegetarians. Can we say that both habits of eating (vegetarian or non-vegetarian) are equally popular in the city at 1% level of significance.



The screenshot shows the RGui (64-bit) window. The R Console pane contains the following code and output:

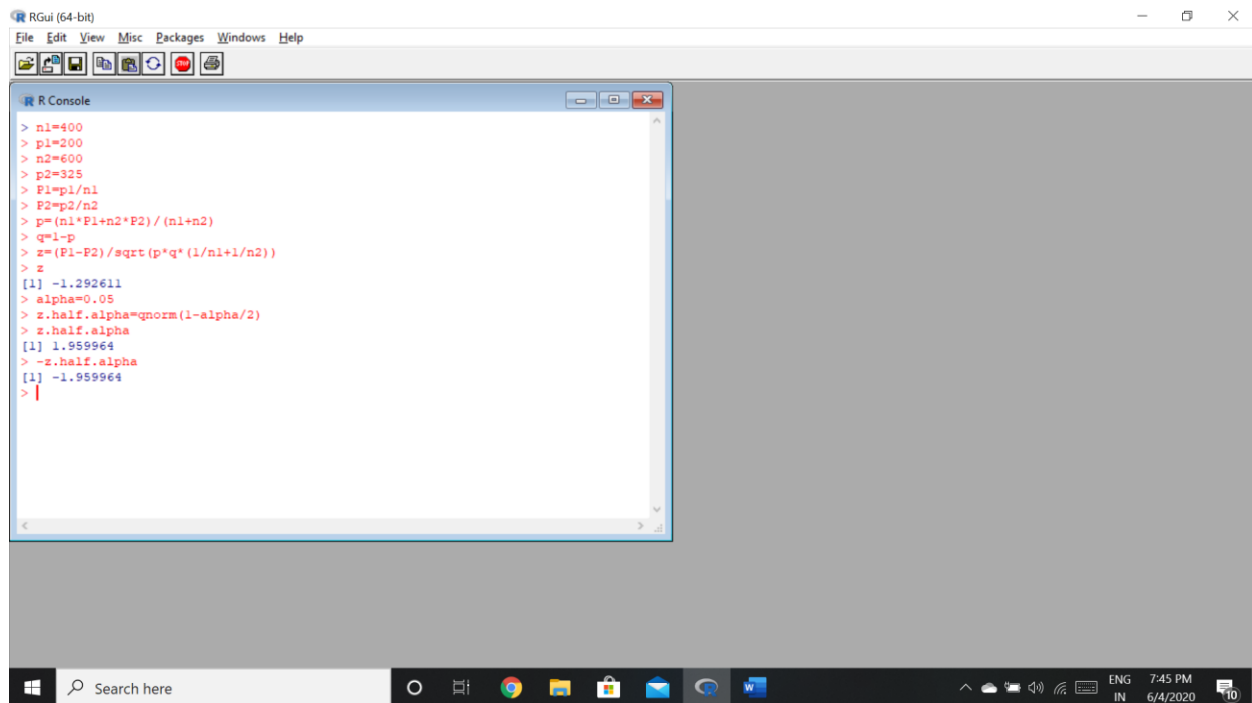
```
> n=1000
> p=0.54
> P=0.5
> Q=0.5
> z=(p-P)/sqrt((P*Q)/n)
> z
[1] 2.529822
> alpha=0.01
> z.half.alpha=qnorm(1-alpha/2)
> z.half.alpha
[1] 2.575829
> -z.half.alpha
[1] -2.575829
> |
```

The Windows taskbar at the bottom shows the search bar, task view button, and several application icons. The system tray on the right indicates the language is English (IN), the time is 7:42 PM, and the date is 6/4/2020.

Inference:

The test statistic 2.529822 lies between the critical values -2.575829 and 2.575829. Hence, at 1% significance level, we do not reject the null hypothesis.

Q4. Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favour of the proposal. Test the hypothesis that proportions of men and women in favour of the proposal are same, at 5% level of significance.



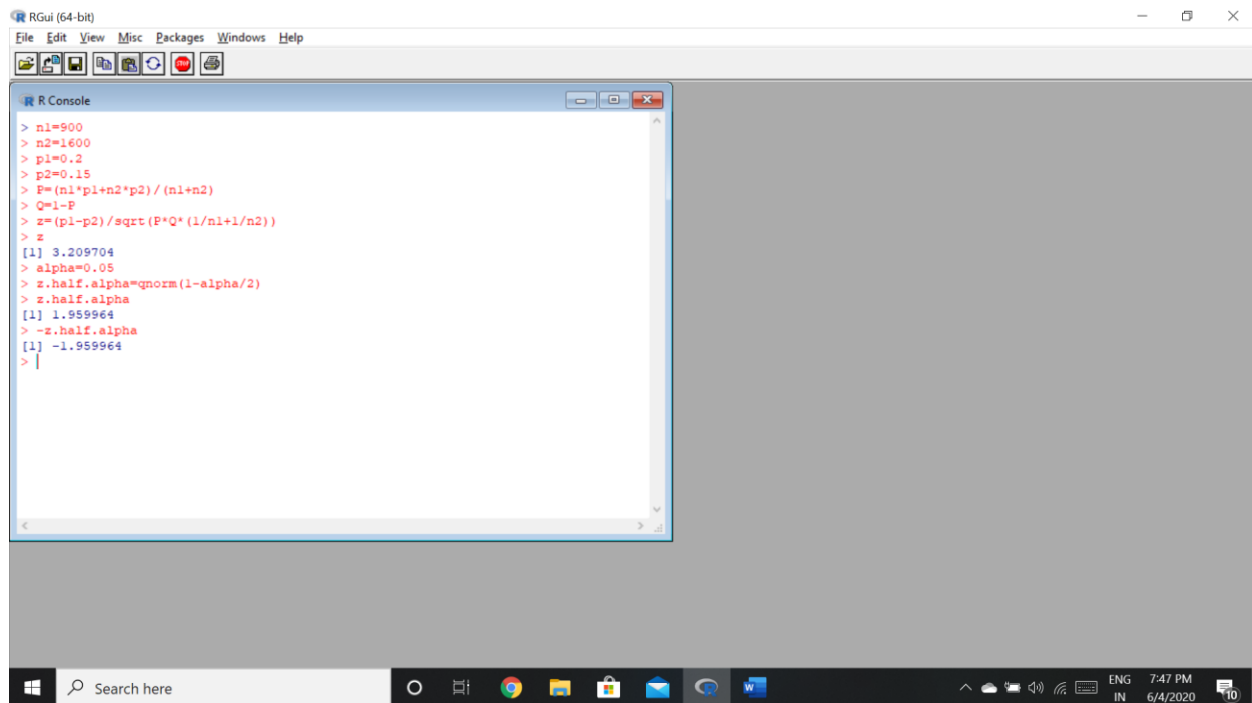
```
RGui (64-bit)
File Edit View Misc Packages Windows Help

R Console
> n1=400
> p1=200
> n2=600
> p2=325
> F1=p1/n1
> F2=p2/n2
> p=(n1*F1+n2*F2)/(n1+n2)
> q=1-p
> z=(F1-F2)/sqrt(p*q*(1/n1+1/n2))
> z
[1] -1.292611
> alpha=0.05
> z.half.alpha=qnorm(1-alpha/2)
> z.half.alpha
[1] 1.959964
> -z.half.alpha
[1] -1.959964
>
```

Interpretation:

The test statistic -1.292611 lies between the critical values -1.959964 and 1.959964. Hence, at 5% significance level, we do not reject the null hypothesis.

Q5. In the large city A, 20% of Random sample of 900 School children had defective eye – sight. In the large city B, 15% of random sample of 1600 school children had the same defective. Is this Difference between the two Proportions Significant? Obtain 95% confidence limits of the difference in the population proportions.



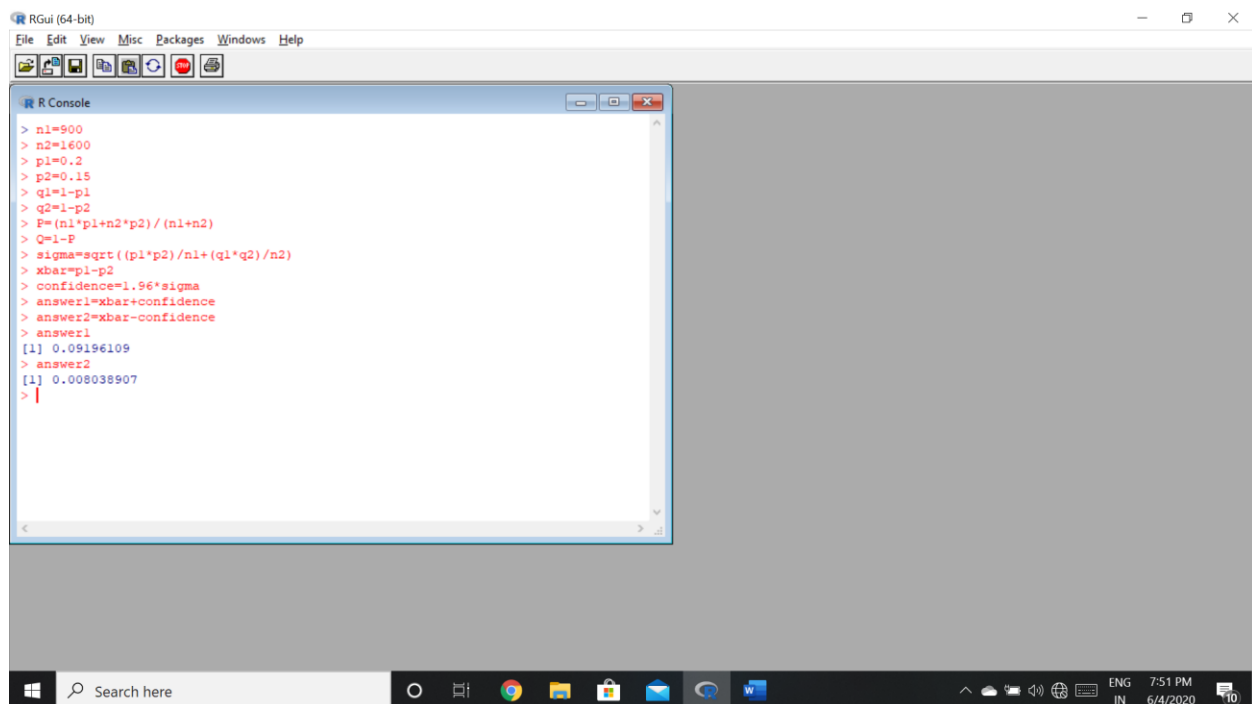
```
RGui (64-bit)
File Edit View Misc Packages Windows Help

R Console
> n1=900
> n2=1600
> p1=0.2
> p2=0.15
> F=(n1*p1+n2*p2)/(n1+n2)
> Q=1-F
> z=(p1-p2)/sqrt(F*Q*(1/n1+1/n2))
> z
[1] 3.209704
> alpha=0.05
> z.half.alpha=qnorm(1-alpha/2)
> z.half.alpha
[1] 1.959964
> -z.half.alpha
[1] -1.959964
> |
```

Interpretation:

The test statistic 3.209704 does not lie between the critical values -1.959964 and 1.959964. Hence, at 5% significance level, we reject the null hypothesis.

95% Confidence limits:



```
RGui (64-bit)
File Edit View Misc Packages Windows Help

R Console
> n1=900
> n2=1600
> p1=0.2
> p2=0.15
> q1=1-p1
> q2=1-p2
> F=(n1*p1+n2*p2)/(n1+n2)
> Q=1-F
> sigma=sqrt((p1*p2)/n1+(q1*q2)/n2)
> xbar=p1-p2
> confidence=1.96*sigma
> answer1=xbar+confidence
> answer2=xbar-confidence
> answer1
[1] 0.09196109
> answer2
[1] 0.008038907
> |
```