**Q1. A teacher claims that the mean score of students in his class is greater than 82 with a standard deviation of 20. If a sample of 81 students was selected with a mean score of 90 then check if there is enough evidence to support this claim at a 0.05 significance level.**

* Mean Square of Students(H0)>82

Mean Square of Students(H1)=<82

σ = 20

n =81

x̄ = 90

μ = 82

α = 0.05

z(test)= (x̄ − μ) / **SE where, SE=** σ/√n =20/√81=20/9=2.22

= (90-82)/2.22

= 8/2.22

=3.603

**Q2. An online medicine shop claims that the mean delivery time for medicines is less than 120 minutes with a standard deviation of 30 minutes. Is there enough evidence to support this claim at a 0.05 significance level if 49 orders were examined with a mean of 100 minutes?**

* Mean Delivery time(H0) < 120

Mean Delivery time(H1)>=120

It’s a right-tail test.

σ = 30

n = 49

x̄ = 100

μ = 120

α = 0.05

SE = σ/√n =30/7=4.28571

z(test)= (x̄ − μ) / **SE**

= (100-120)/4.28

= -20/4.28

=-4.672

**Q3. A company wants to improve the quality of products by reducing defects and monitoring the efficiency of assembly lines. In assembly line A, there were 18 defects reported out of 200 samples while in line B, 25 defects out of 600 samples were noted. Is there a difference in the procedures at a 0.05 alpha level.**

* α = 0.05

α /2 = 0.025

1st Case-

n1 =200

x̄ = 18

P1 = 18/200 = 0.09

2nd Case-

n2 = 600

x̄ = 25

P2 = 25/600 = 0.0416 = 4.16%

H0 = the efficiency of both lines are same

H1 = the efficiency of both lines are not same

It is a two-tailed test.

It’s critical value from z-table = 1.96

P= (P1+P2)/n1+n2 =45/800 = 0.0537

Z= P1- P2 =0.09 – 0.0416 = 0.0484

Z = (P1-P2) / √P(1-P)(1/n1 + 1/n2)

= 0.0484 / √ 0.0537(1-0.0537)(1/200 + 1/600)

= 0.0484 / √0.0508(0.94911)(666\* 10⁻³)

= 0.0484/0.0179

= 2.7

Hence, we reject the null hypothesis. Since, Both lines are different.

**Q4. A school claimed that the students’ study that is more intelligent than the average school. On calculating the IQ scores of 50 students, the average turns out to be 11. The mean of the population IQ is 100 and the standard deviation is 15. State whether the claim of principal is right or not at a 5% significance level.**

* σ = 15

n = 50

x̄ = 110

μ = 100

α = 0.05

H0 = μ =100

H1 = μ > 100

SE = σ/√n

= 15/√50

=15/7.07

=2.12

z(test)= (x̄ − μ) / **SE**

= (110-100) / 2.12

= 10/ 2.12

= 4.71 > 1.64, Hence , we reject null, hypothesis.

**Q5. The population of all verbal GRE scores is known to have a standard deviation of 8.5. The UW Psychology department hopes to receive applicants with a verbal GRE scores over 210. This year, the mean verbal GRE scores for the 42 applicants were 212.79. Using a value of α = 0.05 is this new mean significantly greater than the desired mean of 210?**

* σ = 8.5

n = 42

x̄ = 212.79

μ = 210

z=1.64 for α = 0.05

H0 = μ =210

H1 = μ > 210

SE = σ/√n

= 8.5/√42

= 8.5/6.48

= 1.311

z(test)= (x̄ − μ) / **SE**

= (212.79-210) / 1.311

= 2.79/1.311

= 2.12

Z(2.12)=0.08422