**Problem Statement 1:**

**1.Introduction**

This assignment will help you to consolidate the concepts learnt in the session.

**2.Problem Statement**

Blood glucose levels for obese patients have a mean of 100 with a standard deviation of 15. A researcher thinks that a diet high in raw cornstarch will have a positive effect on blood glucose levels. A sample of 36 patients who have tried the raw cornstarch diet have a mean glucose level of 108. Test the hypothesis that the raw cornstarch had an effect or not.

ANS:

Given: H0 : mu = 100

H1 : mu < 100

Significance level = 5% (assumption)

Mu= 100, x= 108, sd = 15, n= 36

SE = sd/sqrt(n)

Z= (x- mu)/SE.

Z= 3.2

Z.025==/- 1.96

As Z falling on crtical region this test statistic lies in the Rejected region for H0. Thus

null hypothesis H0 will be Rejected and alternative hypothesis H1 is Accepted.

**Problem Statement 2:**

In one state, 52% of the voters are Republicans, and 48% are Democrats. In a second state, 47% of the voters are Republicans, and 53% are Democrats. Suppose a simple random sample of 100 voters are surveyed from each state.

What is the probability that the survey will show a greater percentage of Republican voters in the second state than in the first state?

ANS:

P1 = Proportion of Republican voters in the first state

P2 = Proportion of Republican voters in the second state

P\_1 = Proportion of Republican voters in the sample from the first state

P\_2 = Proportion of Republican voters in the sample from the second state.

N1, N2 = 100

P1 = 0.52 , Q1=(1 - P1), the proportion on non republican voters in first state Q1 = 0.48

P2 = 0.47, Q2=(1 - P2), the proportion on non republican voters in second state Q2 = 0.53

The mean of the difference in sample proportions or the expected value E[P\_1-P\_2] mu =P1 - P2

The standard deviation of the difference (Std) std = math.sqrt(((P1 \* Q1 ) / N1) + ((P2 \* Q2) /N2)) print("Mu : ",mu,"Std : ",std)

This problem requires us to find the probability that P\_1 is less than P\_2

This is equivalent to finding the probability that P\_1 - P\_2 < 0 x = 0

To find this probability, we need to transform the random variable (P\_1 - P\_2) into a z-score. Z= Z\_score(P\_1,P\_2) #That transformation appears below.

Z = (x - mu)/std= -0.7082

From Z table we find that the probability of a z-score being -0.7082 or less is 0.24.

The probability that the survey will show a greater percentage of Republican voters in the second state than in the first state is 0.24.

**Problem Statement 3:**

You take the SAT and score 1100. The mean score for the SAT is 1026 and the standard deviation is 209. How well did you score on the test compared to the average test taker?

ANS:

Lets find the Z

Mu= 1026, x= 1100, sd =29

Z= (x- mu)/Sd.

Z= .35