**Problem Statement 1:**

**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.**

Step 1: State the hypothesis, poulation mean is 108

H0 = 100 => NULL HYPOTHESIS

H1 != 100 => ALTERNATIVE HYPOTHSIS

Step 2: Assume the significance level to be 10% ( 0.1 ) known as alpha level.

It means if the random chance probability is less than 10%, then we can conclude that their difference in behaviour of two different populations.

Step 3: Z-Score test

z = (sample mean – population\_mean) / (population\_sigma / √no of sample)

From Z-score table, the p value associated with 3.2 is 0.9993

The probabilty of having value less than 108 is 0.9993 and more than or equals to 108 is

1-0.9993 = 0.0007

Step 4: The probability of mean glucose level of 108 is 0.0007 which is less than 0.1

Hence, we reject Null Hypothesis

**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?**

**R1 = 0.52 R2 = 0.47**

**D1 = 0.48 D2 = 0.53**

sample = 100 n1 = 100 n2 = 100

r1 – proportions of republican voters in the sample from the first state

r2 - proportions of republican voters in the sample from the second state

mean of sampe proportions i.e, expected value E[r1-r2] = R1 – R2 = mu

mu = R1 – R2

sd = √((R1 \* D1)/n1 + ((R1 \* D2) / n2))

This problem requires finding the probability that R1 is less than R2

This is equivalent to finding the probability that R1 – R2 <0

Suppose x = 0

To find the probability we need to transform the random variable (R1-R2) into z-score value

Z\_score\_R1\_R2 = (x – mu) / sd

The value of z-score is -0.7082 or less is 0.24

Hence, the probability that the survey will show a greater percentage of Republican voters in the scond 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?**

SAT score, x = 1100

SAT mean score = 1026

SD, σ = 209

z = (x – mean score) / SD

z = 1100 -1026 / 209

z = 0.354