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.

no\_of\_sample = 36

sample\_mean = 108

population\_mean = 100

population\_sigma = 15

Z= (108-100)/(15/sqrt(36))

= 3.2

by looking at z- table and p-value associated with 3.20 is 0.9994

The probability of having value less than 108 is 0.9994 and more than or equals to 108 is (1-0.9994)=0.0006.

Sice the probability of having mean glucose level more than or equals to 108 is 0.0006 which is less than 0.05

**so we will reject the Null hypothesis i.e. there is raw cornstarch effect.**

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?

State\_1\_ Republicans 52

State\_1\_Democrats 48

State\_2\_Republicans 47

State\_3\_Democrats 43

P1 = the proportion of Republican voters in the first state

P2 = the proportion of Republican voters in the second state

p1 = the proportion of Republican voters in the sample from the first state

p2 = the proportion of Republican voters in the sample from the second state.

#The number of voters sampled from the first state (n1) = 100

n1 = 100

#The number of voters sampled from the second state (n2) = 100.

n2 = 100

P1 = 0.52

#(1 - P1) = Q1

Q1 = 0.48

P2 = 0.47

#(1 - P2) = Q2

Q2 = 0.53

#The mean of the difference in sample proportions .i.e Expected Value E[p1 -p2] = P1 - P2 = mu

mu = P1 - P2

***The mean of difference in sample proportions 0.05***

SD=((0.52\*0.48)/100)+((0.47\*0.53)/100)=SQRT(0.004987)= 0.070618694

This problem requires us to find the probability that p1 is less than p2.

This is equivalent to finding the probability that p1 - p2 < 0.

x = 0

To find this probability, we need to transform the random variable (p1 - p2) into a z-score.

That transformation appears below.

Z\_p1\_p2 = ( x - mu)/std

=(0-0.05)/0.070618694

**Z = -0.70802782**

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

**Therefore, 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?

The z score tells you how many standard deviations from the mean your score is

x = 1100 #

mu = 1026 # Population Mean

sd = 209 #population standard deviation

z = ( x - mu)/sd

z= (1100-1026)/209

= 0.35

the above calculation shows that my score is 0.35 standard deviations above the mean