**Problem 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.

Population Mean µ : 100

Sample Mean = 108

N=36, δ=15

Let us assume null hypothesis is true

µ0 :µ0 = 100

Also let us assume α = 0.05

P(Z<95) =1.645

From test stastics formulae

Z =(xbar - µ0)/( δ /

Z= (108-100)/(15/

Z = (8\*6)/15

Z= 3.2

From this we can see that Z value for our test stastics is greater and falls under the area of rejection list in or normal distribution graph. Hence we reject our health hypothesis.

Thus raw cornstarch had an effect.

**Problem 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

**Solution**:

The solution involves four steps.

* Make sure the sample size is big enough to model differences with a normal population. Because n1P1 = 100 \* 0.52 = 52, n1(1 - P1) = 100 \* 0.48 = 48, n2P2 = 100 \* 0.47 = 47, and n2(1 - P2) = 100 \* 0.53 = 53 are each greater than 10, the sample size is large enough.
* Find the mean of the difference in sample proportions: E(p1 - p2) = P1 - P2 = 0.52 - 0.47 = 0.05.
* Find the standard deviation of the difference.

σd = sqrt{ [ P1(1 - P1) / n1 ] + [ P2(1 - P2) / n2 ] }   
σd = sqrt{ [ (0.52)(0.48) / 100 ] + [ (0.47)(0.53) / 100 ] }   
σd = sqrt (0.002496 + 0.002491) = sqrt(0.004987) = 0.0706

* Find the probability. This problem requires us to find the probability that p1 is less than p2. This is equivalent to finding the probability that p1 - p2 is less than zero. To find this probability, we need to transform the random variable (p1 - p2) into a [z-score](https://stattrek.com/Help/Glossary.aspx?Target=z-score). That transformation appears below.

zp1 - p2 = (x - μp1 - p2 ) / σd = = (0 - 0.05)/0.0706 = -0.7082

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 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?

Z =(X -µ)/ δ

X = 1100, µ =1026, δ=209

Z= (1100-1026)/209

Z =0.354

This means that my score was 0.354 standard deviation above the mean from Z table

Z(0.354)=0.64 =64%

Thus we can conclude that 64% of the test takers are below me.