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.

⚓**Answer**:

- Consider Ho (null hypothesis), as a raw corn starch diet with no effect. And
  H1 (alternate hypothesis), as a corn starch diet has a positive effect.
  And;
- Only positive effect have to be tested therefore, let perform **1-tailed Test** and the **Level of Significance α = 0.05**
- If we're referring to Left Z-Table http://www.z-table.com/ for the **probability percentage,**
  Then we have ===> **1-0.05 = 0.95**

We observe that the result **0.95** falls in the non-critical region. However the Z score critical is equivalent to **1.645. Therefore if Z score value is superior then z score critical, then we conclude to reject Null Hypothesis or we accept it.**

- **Formulae**: Standard Error of Sample Distribution =
  Population standard deviation (15) / Sqrt(Number of samples(36)
  Calcul: **15/sqrt(36) = 2.5**

- **Formulae:** Z score value of standard normal distribution =
  Sample Mean - Population mean / Standard Error of Sample Distribution
  Calcul: **108-100/2.5 = 3.2**

♟ **Based on that result I can conclude that a diet high in raw corn starch will definitely have a positive effect on blood glucose levels.**

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?

⚓**Answer**:

Considering the Mean of the difference in sample proportion of Republicans of State 1&2.

52%-47% = 5% = 0.05

Now can we try to find the Standard Deviation of the difference.

sd = Sqrt((0.52*0.48)/100+(0.47*0.53)/100) = 0.0706

Finally to find out the probability that Republicans of State 1&2 is less than zero. We can now transform the random variable into a Z-score.

Z-score = (0-0.05)/0.0706 = -0.7082

♟**Then using the** http://www.z-table.com/ **we can find that the probability of a Z-score being -0.7082 or less is 0.24, which also is the probability shows a greater percentage of Republican voters in the second stats than in the first state.**

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?

⚓**Answer**: The standard Normal Distribution is calculated has followed:

(1100 - 1026)/209 = 0.3540 ≙ 63.68%

♟Therefore the individual scored **63.68% is greater than the average test taker.**