STAT ASSIGNMENT 3

**Q1. Blood glucose levels for obese patients have a mean of 100 with a standard deviation of**

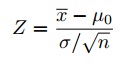
**15. A researcher thinks that a diet high in raw cornstarch will have a positive effect on**

**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.**

Solution:

Step 1: [State the null hypothesis](https://www.statisticshowto.com/probability-and-statistics/null-hypothesis/#state): H0:μ=100 or corn starch had no effect  
Step 2: State the [alternate hypothesis](https://www.statisticshowto.com/what-is-an-alternate-hypothesis/): H1:≠100  
Step 3: State your[alpha level.](https://www.statisticshowto.com/what-is-an-alpha-level/) We’ll use 0.05 for this example. As this is a two-tailed test, split the alpha into two.  
0.05/2=0.025  
Step 4: Find the [z-score](https://www.statisticshowto.com/probability-and-statistics/z-score/) associated with your [alpha level](https://www.statisticshowto.com/what-is-an-alpha-level/). You’re looking for the area in one tail only. A z-score is 1.96. As this is a two-tailed test, you would also be considering the left tail (z=1.96)  
Step 5: Find the [test statistic](https://www.statisticshowto.com/test-statistic/) using this formula: [](https://www.statisticshowto.com/wp-content/uploads/2014/02/z-score-formula.jpg)  
z=(108-100)/(15/√36)=3.07  
Step 6: If Step 5 is less than -1.96 or greater than 1.96 (Step 3), [reject the null hypothesis](https://www.statisticshowto.com/support-or-reject-null-hypothesis/). In this case**, it is greater, so you can reject the null.**

**Corn starch had effect**

**Question 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:  
mean of the difference in sample proportions: E(p1 - p2) = P1 - P2 = 0.52 - 0.47 = 0.05.  
Finding the standard deviation of the difference :

= 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

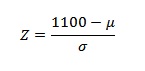
* This problem requires us to find the probability that p1 is less than p2.. To find this probability, we need to transform the random variable (p1 - p2) into a [z-score](https://stattrek.com/Help/Glossary.aspx?Target=z-score).

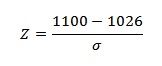
Z(p1 - p2 )= (x - μp1 - p2 ) / σd = = (0 - 0.05)/0.0706 = -0.7082

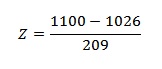
we find that the probability of a z-score being -0.7082 or less is 0.24.Therefore, the probability that the survey will show a greater percentage of Republican voters in the second state than in the first state is 0.24.

**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?

Step 1: **Write X-value into the z-score equation**. the X-value is your SAT score, 1100.  
[](https://www.statisticshowto.com/wp-content/uploads/2013/08/CALCULATE-A-Z-SCORE-1.jpg)

Step 2: **Put the mean, μ, into the z-score equation**.  
[](https://www.statisticshowto.com/wp-content/uploads/2013/08/CALCULATE-A-Z-SCORE-2.jpg)

Step 3: **Write the standard deviation, σ into the z-score equation**.  
[](https://www.statisticshowto.com/wp-content/uploads/2013/08/CALCULATE-A-Z-SCORE-3.jpg)

=(1100 – 1026) / 209 = .354. This means that my score was .354 std devs above the mean.

So , my score was above the mean and I scored well.