**Assignment stats 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.

Ans. Population mean (μ) = 100

Population standard deviation (σ) = 15

Sample mean ( x ) = 108

Significance level (α) = 5% = 0.05

Sample size (n) = 36

H0: Mean = 100

H1: Mean ≠ 100

Here, the sample is large and the population variance is known but since, we don’t know about the

normality of the data, we will use the Z-test from the table above.

Z(test) = x - μ

σ /

= (108 - 100)/2.5 = 3.2

Let’s find out the critical value at 5% significance level using the Critical value table.

Z (0.05) = 1.64 (since it is right tailed test).

We can clearly see that Z(test) > Z (0.05), that means our test value lie in the rejection region.

Thus, we can reject the null hypothesis

**Using p-value to test the above hypothesis:**

p-value = P[Z>=3.2] = 1 – 0.9993 = 0.007

i.e. p-value < 5% significance level and we are right in rejecting the null hypothesis.

Q2. 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?

Ans. No. of voters sampled in first state (n1) = 100

No. of voters sampled in second state (n2) = 100

The probability of Republican voters in the first state (1) = 0.52

The probability of Republican voters in the second state (2) = 0.47

Significance level(α) = 5% = 0.05

Let the probability of Republican voters in the sample in the first state = 1

& the probability of Republican voters in the second state = 2

We have to find out probability that 1 -2 < 0

So first we have to find out z-score at 1 -2

z(score)= D - 1 - 2

= 0 - 0.52 - 0.47/ 0.0706 = - 0.7082

P (z <=- 0.7082) = 0.24

i.e. probability that the survey will show a greater percentage of Republican

voters in the second state than in the first state is 0.24 = 24%

Q3. 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?

Ans. Population mean (μ) = 1026

Population standard deviation (σ) = 209

Sample mean ( x ) = 1100

Z(score) = x - μ

σ /

= (1100 - 1026)/209 = 0.354

i.e. our score is 0.354 standard deviations above the mean

P(z <= 0.35) = 0.6368 = 63.68%

63.68% of the students score below our score