**Stats class Assignments**

**Stats Assignment -3**

Q-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.

Sol:

Here,

H0: μ=100 ( raw diet doesn’t have effect )

Ha: μ>100 (raw diet has effect)

Significance level is not given here but we will test this hypothesis at 5% significance level ( 5% is commonly used )

α = 5%= 0.05

since the population of standard deviation is known we will use z- test .

Z= X - μ / SE SE= sd/ √n

SE= 15/√36 =2.5

Z = 108-100/ 2.5 = 3.20

From z table we can look for P values of 3.20 which is equal to 0.9993

Which implies that probablility of having less than 108 is 99.93% and more than is or euals to 108 is 0.007

Z(0.05) = 1.65

So z test value shows that it falls under critical region so Null hypothesis is rejected i.e there is effect of raw cornstarch diet.

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?

Sol:

Here,

Let P1= proportion of Republican voter of state1

P2=proportion of republican voter of state2

Also p1=proportion of republican voter from the sample of state 1

p 2= proportion of republican voter from the sample of state 2

n1= number of voter sample from state 1 =100

n2 =number of voter sample from state2 = 100

we will check the sample of each population are big to model the difference with normal distribution

n1P1=100\*0.52 = 54

n2(1-P1)=100\*48= 48

n2P2= 100\*0.47 = 47

n2(1-P2) = 100\*0.53=53 each are greater than 10 , so our sample size is large enough

mean difference in sample proportion : E(p1-p2)=P1-P2=0.52-0.47=0.05

standard deviation of the difference ;

σ (sd) =√{[p1(1-P1)/n1]+[P2(1-P2)/n2]}

=√{[(0.52)(0.48)//100]+[(0.47)(0.53)/100]

=√(0.002496+0.002491)

=√ 0.004987

=0.0706

We will find the probability that p1 <p2. This is equivalent finding p1-p2<0

We will find the z score

Z(p1-p2) = { x – μ(p1-p2)}/( σ sd)

=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 voter in the second state against the forst state is 0.24.

Q-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?

Sol:

We will calculate the Z score

Z= X - μ / σ

Here, x=1100, μ= 1026, σ = 209

Z= 1100-1026/209 =0.354

It means that my SAT score was .354 standard deviation above the mean or average test taker.