# Statistics Assignment 3

(3)

Problem statement 1:

(1) Blood glucose levels for obese patients have a mean of 100 with a S.D 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 standard deviation is known and the sample is large $\geq 30$, thus normal distribution is used.

$H_0$ $\mu = 100$

$H_a$ $\mu \neq 100$

Assume 95% Confidence level

CV, $z_{0.025} = 1.96$

Test statistic $= \dfrac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} = \dfrac{108 - 100}{\frac{15}{\sqrt{36}}}$.

$\dfrac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} = \dfrac{108 - 100}{\frac{15}{\sqrt{36}}} = 3.2$

Since the calculated statistic 14.61 is greater than critical value 1.96 we reject null hypothesis & Conclude that raw Cornstarch had effect on blood glucose level.

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 & 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 that in the first state?

$$E(p_1 - p_2) = P_1 - P_2 = 0.52 - 0.47 = 0.05$$

$$\sigma_d = \text{sqrt}\{[P_1(1-P_1)/n_1] + [P_2(1-P_2)/n_2]\}$$

$$\sigma_d = \text{sqrt}\{[(0.52)(0.48)/100] + [(0.47)(0.53)/100]\}$$

$$\sigma_d = \text{sqrt}(0.002496 + 0.002491) = \text{sqrt}(0.004987) = 0.0706$$

$$z_{p_1 \cdot p_2} = (x - \mu_{p_1 p_2})/\sigma_d = (0 - 0.05)/0.0706 = -0.7082$$

T-table the probability of z-score being -0.7082 or less is 0.24

Therefore Probability ~~survey~~ survey

There, the probability that the survey will show a greater percentage of Republican voters in the second state than in the first state is 0.024

Problem statement 3

You take the SAT & score 1100. The mean for the SAT is 1026 & the S.D is 209 How well did you score on the test Compared the average test taker?

→ $x = 1100$, $\sigma = 209$ $\mu = 1026$

$$z = \frac{x - \mu}{\sigma} = \frac{1100 - 1026}{209} = .354$$

The score was .354 std. above the mean

look up z-table.

.354 is 1368 + 5000* = 6368 or 63.68 %

The z-table shown has scores for the mean therfore we add .500 for all LEFT