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Prob 1, Qs. 1

The null hypothesis(H_0) is $\mu = 0.75$, and the alternative hypothesis(H_1) is $\mu \neq 0.75$. We can use z-test.

Prob 1, Qs. 2

The size of the knowledgeable student sample is 937.

The mean of the knowledgeable student sample is 0.743030.

The standard error of the knowledgeable student sample is 0.004151.

The standard score of the knowledgeable student sample is -1.679091.

The p-value of the knowledgeable student sample is 0.093134.

The result is significant about 0.1, since $p \leq 0.1$, but the result is not significant about 0.05 and 0.01 since $p > 0.05$ and $p > 0.01$.

We can conclude that we reject null hypothesis H_0 in favor of alternative H_1 if $\alpha = 0.1$; otherwise, we do not reject null hypothesis H_0 (if $\alpha = 0.05, 0.01$).

Prob 1, Qs. 3

The largest standard error of knowledgeable student sample when p value is 0.05 is 0.003556.

The minimum size of knowledgeable sample when p value is 0.05 is 1277.

Prob 1, Qs. 4

The null hypothesis(H_0) is $\mu \neq 0$ (different), and the alternative hypothesis(H_1) is $\mu = 0$ (not different). We can use z-test.

Prob 1, Qs. 5

The sample size of knowledgeable student sample is 937.

The sample size of unknowledgeable student sample is 1977.

The mean of knowledgeable student sample is 0.743030.

The mean of unknowledgeable student sample is 0.639955.

The standard error is 0.007063.

The z-score of the sample is -14.593892.

The p-value of the sample is 0.000000.

The result is significant at levels 0.1, 0.05 and 0.01 since the p value is 0 that is less than 0.1, 0.05 and 0.01.

We can conclude that we reject null hypothesis H_0 in favor of alternative H_1 .

Prob 2, Qs. 1

Since there is very few datapoints, I should use t distribution.

The mean of the sample is 7.363636.

The standard error of the sample is 4.840041.

The standard statistic (t value) is 2.228139.

The interval is:

[-3.4206467137189058, 18.147919440991632]

Prob 2, Qs. 2

The standard statistic (t value) is 1.812461.

The interval is:

[-1.40874952149594, 16.136022248768668]

Prob 2, Qs. 3

I should use norm distribution and apply z test if I have the true population standard deviation.

The standard statistic (z value) is 1.959964.

The standard error of the sample is 5.076245.

The interval is:

[-2.5856210077952682, 17.312893735067995]

This result is between 95% and 90% confidence interval.

Prob 2, Qs. 4

The confidence is: 0.840869%.