HW 6

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Question 1

a)

Proportion

b)

Mean

c)

Proportion

d)

Proportion

e)

Mean

Question 2

a)

The population to be considered is adults in United States.

b)

The parameter being estimate is the adult in the United States that could not cover a $400 unexpected expense without borrowing money or going into deb.

c)

The point estimate for the parameter = 322 / 765 = 0.420915

d)

standard error

e)

$SE = \sqrt{\frac{\hat{p}*(1-\hat{p})}{n}} = \sqrt{\frac{0.4209*(1-0.4209)}{765}} = 0.0178$

f)

I think it is a surprising result because there is more than 4 standard error between 0.5(p) and 0.4209(p hat).

g)

$SE = \sqrt{\frac{p*(1-p)}{n}} = \sqrt{\frac{0.4*(1-0.4)}{765}} = 0.0177$ The result value did not change very much there is only 0.0001 difference.

Question 3

a)

False, because: $\hat{p} = 0.52, p = 0.5$

$n = \frac{2.57*0.52*(1-0.52)}{(0.024)^2} = 1113.667 = 1114$

Test Z-value: $Z = \frac{\hat{p}-p}{\sqrt{\frac{p*(1-p)}{n}}} = \frac{0.52-0.5}{\sqrt{\frac{0.5*(1-0.5)}{1114}}} = 1.335065$

P-value = 0.9099

The p-value(0.9099) is greater than alpha(0.01) which means that we faild to reject H_o and there is no sufficient evidence to prove the hyphothesis.

b)

False, because the standard error helps to find the range of the percentage but not the population of the study.

c)

False, because if people want to have a samller standard error, they need to increase the sample size.

d)

False, because the 99% of confidence interval has a wider interval than 90% of confidence interval.

Question 4

a)

We are 95% confident that the true proportion is between 3.40 and 4.24.

b)

The 95% confidence interval is a range of values that you can be 95% confident contains the true mean of the population.

c)

The 99% confidence interval is wider than the 95% confidence interval.

d)

I think the standard error will be larger since the sample is smaller.

Question 5

p hat = 142 / 603 = 0.2355

n = 603

$CI + \alpha = 1$

$\alpha = 1 - 0.95 = 0.05$

$CI = \hat{p}ś Z_{\frac{\alpha}{2}} * \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = 0.23ś1.65 * \sqrt{\frac{0.23(1-0.23)}{603}} = (0.2017, 0.2583)$

The 95% confidence interval is (20.17%, 25.83%).

Question 6

The error of this problem is that the p is 25%, so the hypothesis is needed to based on the population proportion. The H0 will be p equals to 0.25 and the Ha will be p does not equals to 0.25.

Question 7

p = 0.08

p hat = 21 / 194 = 0.1082

n = 194

Hypothesis:

Ho: p = 0.08

Ha: p not equal 0.08

Test z value: $Z = \frac{\hat{p}-p}{\sqrt{\frac{p*(1-p)}{n}}} = \frac{0.1082-0.08}{\sqrt{\frac{0.08*(1-0.08)}{194}}} = 1.45$

Find the P-value: P(Z > 1.45) = 1 - 0.9265 = 0.0735

0.0735 > 0.05 then we fail to reject Ho, we do not have sufficient evidence to prove.

Question 8

True. When the sample size getting larger, then the standard error will be smaller. Under this situation, people can find that the null value and point estimate are statistically significant.

Question 9

a)

False, because the Type 1 error occurs when a null hypothesis is rejected.

b)

False, because when the p-value is greater than the level of significance, then it fails to reject the null hypothesis.

c)

True, the p-value is a uniform random variable between 0 and 1.

d)

False, because the interpret of the confidence interval is that people are 95% confident that the true proportion is between 0.393 and 0.553.

Question 10

p = 0.05

p hat = 14 / 160 = 0.0875

n = 160

alpha = 0.01

Hypothesis:

Ho: p = 0.05

Ha: p not equal 0.05

Test z value: $Z = \frac{\hat{p}-p}{\sqrt{\frac{p*(1-p)}{n}}} = \frac{0.0875-0.05}{\sqrt{\frac{0.05*(1-0.05)}{160}}} = 2.18$

P- value: P(Z > 2.18) = 1 - 0.9854 = 0.0146

Since the p-value(0.0146) is greater than the level of significance(0.01), then we fail to reject Ho and there is no sufficient evidence to proce the hypothesis.