STAT 3400 - Homework #6

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Due March 8, 2023

Problem 13.8.1

a. Critical value = 2

Critical value * standard error = 2.4

Interval = [45 - 2.4, 45 + 2.4]

A 95% confidence interval for this study would be between 42.6% and 47.4%. This means we're 95% confident that the true percentage of US adults that live with one or more chronic conditions is between 42.6% and 47.4%.

b. i. False. We're not certain because we expect the true percentage to fall outside this range 5% of the time.

ii. True. This aligns with our 95% confidence.

iii. True. Only 2.5% of the data is expected to be above 47.4%, so less than 5% must be expected to be below 50%.

iv. False. The standard error represents the average distance from the median of the sample statistic, in this case the percentage of US adults that live with one or more chronic conditions.

Problem 13.8.2

a.

```
qnorm(p=0.005,mean=0,sd=1,lower.tail=FALSE)
```

```
## [1] 2.575829
```

Critical value = 2.576

Critical value * standard error = 6.18

Interval = [52 - 6.18, 52 + 6.18]

A 95% confidence interval for this study would be between 45.82% and 58.18%. This means we're 99% confident that the true percentage of US adult twitter users that get at least some news from twitter is between 45.82% and 58.18%.

b. i. False. The 99% confidence interval extends well below 50% on the left side.

ii. False. The standard error represents the average distance from the median of the sample statistic, in this case the percentage of US adult twitter users that get at least some news from twitter.

iii. False, Collecting less data will increase the standard error because the standard error is inversely related to the square root of the number of samples.

iv. False. The higher the percentage, the wider the confidence interval.

Problem 13.8.3

a. This is not a good interpretation because the probability that the null hypothesis is true isn't equivalent to the Z score.

b. This is not a good interpretation because the probability of obtaining a sample proportion as far as observed from the hypothesized value of the population proportion given the null hypothesis is true isn't equivalent to the Z score.

c. This is the best interpretation.

d. This is not a good interpretation because the sample proportion is 0.47 times the standard error plus the expected value for the population, not just 0.47 times the standard error.

e. This is not a good interpretation because the sample proportion is 0.47 times the standard error plus the expected value for the population, not just 0.47 plus the expected value.

f. This is not a good interpretation because the sample proportion is not equivalent to the Z score.

Problem 13.8.4

a. We are 95% confident that the true population mean is between 3.40 and 4.24 days.

b. It means that if we were to take 100 samples of this size from the population, we expect the interval generated from 95 of them to contain the population mean.

c. The new interval will be wider.

d. Standard error would be larger because it's inversely related to sample size.

Problem 13.8.5

a. This is called a sampling distribution.

b. I'd expect it to be right skewed because you can't have outliers very far on the left side when the expected mean is between 5% and 30% because you can't go below 0% but you can have outliers on the right side.

c. The variability of this distribution is called standard error.

d. Standard error would be larger because it's inversely related to sample size.

Problem 13.8.6

a. This is called a sampling distribution.

b. I'd expect it to be right skewed because you can't have outliers very far on the left side when the expected mean is 16% because you can't go below 0% but you can have outliers on the right side.

c. The variability of this distribution is called standard error.

d. Standard error would be smaller because it's inversely related to sample size.