# ST 314 - Data Analysis 7

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## Part 1

a. $\hat{p} = \frac{200}{217} = 0.9217$

b. It may be reasonable to use the current student data to represent the population of all current OSU engineering students because ST314 is a common requirement for different engineering majors. It is randomized enough between different engineering majors such as Civil Engineering, Mechanical Engineering, Computer Science, etc.

c. It may not be reasonable to use the current student data to represent the population of all current OSU engineering students because the sample is only taken from ST314 Winter 2019 class, therefore there is a sampling bias in the form of convenience bias.

d. $np = 217 \times 0.9217 = 200$
$n(1-p) = (217)(1-0.9217) = 17$
Both groups have a sample size greater or equal to 10.

e. 99% $CI = \hat{p} \pm (z_{\alpha/2})(SE_{\hat{p}})$

$$= 0.9217 \pm 2.576\left(\sqrt{\frac{0.9217(1-0.9217)}{217}}\right)$$

$$= (0.8747, 0.9686)$$

f. The 99% CI estimates the proportion of students with social networking profile to be between 0.8747 and 0.9686, with a sampled proportion of 0.9217.

## Part 2

a. It is not reasonable to assume the actual proportion of all OSU engineering students with social profile to be 0.81 because there is less than 1% confidence that the actual proportion lies outside the interval.

b. I would reject the null hypothesis (0.81) because it is 3 standard deviation less than the smallest value of the interval (0.8747).

c. OSU engineering students might spend less time on social network than the average American. It is possible that this difference makes 0.81 as an unrealistic estimate for p.

## Part 3

a. It suggests that $\hat{p}_2$ is greater than $\hat{p}_1$

b. The 90% CI will also contain all negative values because it is more precise and not as wide as 95% CI. The 99% CI may contain positive values because it is wider and less precise than 95% CI.

c. $(\hat{p}_1 - \hat{p}_2) + (1.96)\left(SE_{\hat{p}_1 - \hat{p}_2}\right) = -0.003$
$(\hat{p}_1 - \hat{p}_2) + (1.96)(SE_{\hat{p}_1 - \hat{p}_2}) = -0.227$
$\hat{p}_1 - \hat{p}_2 = -0.115$
$SE_{\hat{p}_1 - \hat{p}_2} = 0.0571$
$99\%\ CI = \ -0.115 \pm 2.576(0.0571) = (-0.2622, 0.0322)$

d. We can conclude that there is a small possibility that $\hat{p}_1$ is greater than or equal to $\hat{p}_2$.