Statistics 101 - Laboratory 9

Last week's lab looked at the sampling distribution of the sample proportion $\hat{p}$. This week's lab is a continuation of last week's lab where you will use the random samples and the resulting sample proportions to construct confidence intervals for the population proportion of blue eyed Statistics 101 students.

1. The laboratory TA will return your lab from last week. Each member of your lab group will use his/her sample of size 10 from last week's lab to construct an 80% confidence interval for the population proportion of blue eyed Statistics 101 students.

2. Write each of your group's 80% confidence intervals on the blackboard. Once there are 25 confidence intervals listed on the board, plot them on the graph on the answer sheet.

3. To see how many confidence intervals contain the population proportion value of 0.312, draw a vertical line on your graph at p = 0.312. How many confidence intervals cover (or capture) the true population proportion?

4. How many confidence intervals should cover (or capture) the true population proportion? Explain briefly.

5. Is the Success/Failure condition satisfied for random samples of n = 10 with p = 0.312? Support your answer with the appropriate calculations. What does this indicate about the shape of the sampling distribution of sample proportion $\hat{p}$? What impact does this have on the proportion of confidence intervals that cover (or capture) the true population proportion?

6. Combine your separate random samples into one, larger, random sample. The size of this larger random sample should be at least 40. If it is not, you will need to collect some more data. Compute a sample proportion of blue eyes for this larger sample and construct an 80% confidence interval for the population proportion of blue eyes.

7. Is the Success/Failure condition satisfied for your larger random sample with p = 0.312? Support your answer with the appropriate calculations. What does this indicate about the shape of the sampling distribution of sample proportion $\hat{p}$? What impact does this have on the proportion of confidence intervals that cover (or capture) the true population proportion?

8. Compare the width of your 80% confidence interval for the larger sample to the width of an 80% confidence interval based on 10 observations. How has increasing the sample size changed the width of the 80% confidence interval?

9. Using your larger random sample, construct a 90% confidence interval for the population proportion of blue eyes.

10. Compare the width of your 80% confidence interval for the larger sample to the width of a 90% confidence interval for the larger sample. How has increasing the level of confidence changed the width of the confidence interval?

Statistics 101 - Laboratory 9
Group Answer Sheet

Names of Group Members: _____, _____

_____, _____

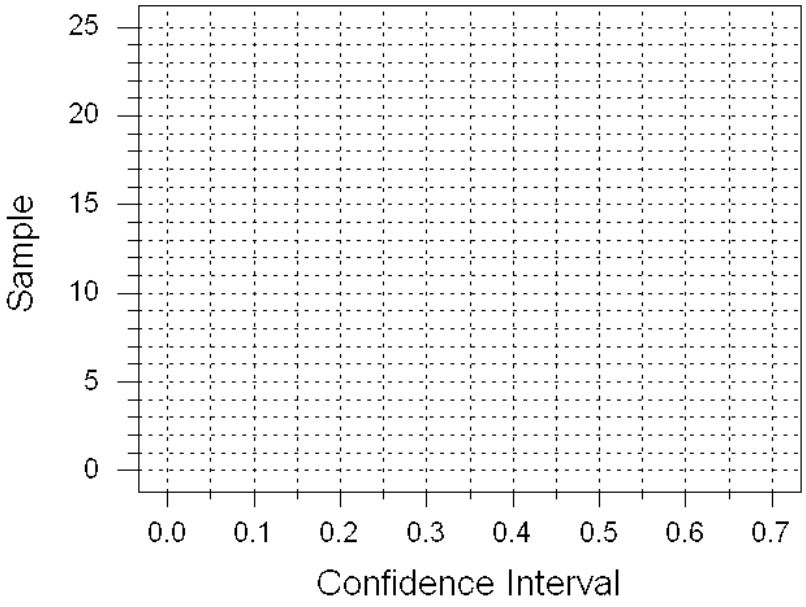
$$\hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

Confidence Level	80%	90%	95%	98%	99%
z^*	1.282	1.645	1.96 or 2	2.326	2.576

1.

	n =	$\hat{p}$ =	n =	$\hat{p}$ =	n =	$\hat{p}$ =	n =	$\hat{p}$ =
80% CI								

2. Plot 25 confidence intervals on the graph below.



3. How many confidence intervals cover (or capture) the true population proportion?

4. How many confidence intervals should cover (or capture) the true population proportion? Explain briefly.

5. Is the Success/Failure condition satisfied for random samples of n = 10 with p = 0.312? Support your answer with the appropriate calculations. What does this indicate about the shape of the sampling distribution of sample proportion $\hat{\boldsymbol{p}}$? What impact does this have on the proportion of confidence intervals that cover (or capture) the true population proportion?

6. Compute a sample proportion of blue eyes for this larger sample, at least 40 observations, and construct an 80% confidence interval for the population proportion of blue eyes.

7. Is the Success/Failure condition satisfied for your larger random sample with p = 0.312? Support your answer with the appropriate calculations. What does this indicate about the shape of the sampling distribution of sample proportion $\hat{\boldsymbol{p}}$? What impact does this have on the proportion of confidence intervals that cover (or capture) the true population proportion?

8. Compare the width of your 80% confidence interval for the larger sample to the width of an 80% confidence interval based on 10 observations. How has increasing the sample size changed the width of the 80% confidence interval?

9. Using your larger random sample, construct a 90% confidence interval for the population proportion of blue eyes.

10. Compare the width of your 80% confidence interval for the larger sample to the width of a 90% confidence interval for the larger sample. How has increasing the level of confidence changed the width of the confidence interval?

Eye Color for Population of 250 Statistics 101 Students

	0	1	2	3	4	5	6	7	8	9
00	blue	brown	blue	brown	green	blue	brown	green	green	brown
01	hazel	green	blue	hazel	brown	blue	brown	brown	brown	blue
02	blue	brown	blue	brown	hazel	green	brown	brown	green	green
03	green	brown	brown	brown	green	brown	brown	green	hazel	green
04	brown	blue	other	blue	blue	hazel	brown	hazel	green	brown
05	brown	brown	brown	blue	blue	brown	blue	brown	blue	blue
06	green	blue	hazel	brown	green	green	blue	blue	blue	blue
07	green	hazel	blue	hazel	brown	green	green	blue	brown	green
08	brown	hazel	brown	blue	blue	blue	brown	brown	hazel	brown
09	blue	green	blue	green	brown	other	brown	blue	blue	brown
10	blue	brown	brown	hazel	blue	brown	brown	blue	green	brown
11	brown	blue	blue	blue	other	green	blue	hazel	green	brown
12	blue	blue	hazel	blue	hazel	brown	other	blue	green	blue
13	blue	brown	hazel	brown	blue	hazel	brown	blue	green	blue
14	brown	hazel	blue	hazel	hazel	blue	brown	blue	blue	brown
15	brown	brown	hazel	hazel	green	brown	brown	brown	brown	blue
16	green	hazel	blue	green	brown	brown	hazel	blue	blue	blue
17	green	green	other	brown	green	brown	brown	green	brown	brown
18	green	green	blue	blue	blue	brown	green	hazel	brown	green
19	brown	hazel	blue	blue	hazel	blue	brown	brown	green	green
20	green	brown	green	green	brown	blue	other	blue	hazel	blue
21	green	blue	brown	green	other	blue	blue	hazel	brown	hazel
22	green	blue	blue	blue	green	brown	green	blue	hazel	brown
23	brown	blue	blue	brown	brown	hazel	blue	brown	brown	brown
24	blue	brown	blue	brown	green	green	blue	hazel	blue	brown