STAT 1350, 4/14 Discussion Questions

1. What is the formula for the standard deviation for the sampling distribution of a proportion?

$$\sqrt{\frac{p(1-p)}{n}}$$

2. What is the formula for the standard deviation for the sampling distribution of a mean?

$$\frac{s}{\sqrt{n}}$$

3. What is the formula for a confidence interval for a proportion? For a mean?

$$\hat{p} \pm z\sqrt{\frac{p(1-p)}{n}} \qquad \bar{x} \pm z\frac{s}{\sqrt{n}}$$

$$\left(p - z\sqrt{\frac{p(1-p)}{n}},\ p + z\sqrt{\frac{p(1-p)}{n}}\right) \qquad \left(\bar{x} - z\cdot\frac{s}{\sqrt{n}},\ \bar{x} + z\cdot\frac{s}{\sqrt{n}}\right)$$

4. Give at least one way to find the z-score needed for the confidence interval. What are some typical values? (For, say, 90%, 95%, and 99% confidence.)

Subtract confidence interval from 100%, Then divide by 2 level

put that into invNorm( ), or look up in table in book

A recent Gallup Poll interviewed a random sample of 1523 adults. Of these, 868 bought a lottery ticket in the past year.

5. What is a 95% confidence interval for the proportion of all adults who bought a lottery ticket in the past year? Use the formula in this chapter, not the "quick method".

(.545, .595)

6. Suppose that in fact (unknown to Gallup) exactly 60% of all adults bought a lottery ticket in the past year. If Gallup took many simple random samples of 1523 people, the sample proportion who bought a ticket would vary from sample to sample. The sampling distribution would be close to normal with what mean and standard deviation?

mean = .60, st.dev = $\sqrt{\frac{.6(1-.6)}{1523}}$ = 0.01255 or about .013

7. The same Gallup Poll asked its 1523 adult respondents and also 501 teens (ages 13 to 17) whether they generally approved of legal gambling: 63% of adults and 52% of teens said yes. The margin of error for a 95% confidence statement about teens would be what? Use the formula in this chapter (standard score * standard deviation of the sampling distribution) not the quick method.

X = 261

(.477, .565)

8. Although the result will vary if the poll is repeated, the distribution of results is centered at the truth about the population (66%). We call this desirable property of a simple random sample what?

Central limit theorem
or law of large #'s

9. For a 95% confidence interval, a larger sample size will generally do what to the width of the confidence interval?

Shorten it

10. A sample survey finds that 30% of a sample of 874 Ohio adults said good health was the thing they were most thankful for. If that sample were a simple random sample from the population of all Ohio adults, what would be the 99% confidence interval for the percent of all Ohio adults who feel that way?

$X = .3 * 874 = 262$

$(.25985, .33969)$ or $(.26, .34)$

11. If the 874 people in the previous question had called a 900 number to give their opinions, how would this affect your response?

meaningless; voluntary response polls are biased

12. A recent survey of 35,101 randomly selected U.S. adults studied the religious affiliation of Americans. The survey interviewed 245 people in Maine. Suppose that this is a simple random sample of adult residents of Maine. Of these 245 people, 56 said they attend religious services at least once a week. A 95% confidence interval for the proportion of all residents of Maine who attend religious services at least once a week is approximately what?

$(.17599, .28115)$ or $(.176, .281)$

13. Describe the basic principles of the Central Limit Theorem in your own words?

as the sample size gets larger,
the sampling distribution gets narrower
and more normal