Barnett

AP Statistics

Packets 11-16

Packet 11:

1. Read through Section 8.1 notes and look over examples on pages 495 – 505 in textbook.
2. Watch the following video: ***It is not an example from your book (ignore page numbers), but walks you through an example very similar.
   https://www.youtube.com/watch?v=Tiz3JBHMMkU

Packet 12:

1. Complete the following problems on textbook page 506 – 508 problems 4, 6, 8, 12, and 20.

Packet 13:

1. 8.1 Worksheet

Packet 14:

1. Read through Section 8.2 notes and look over examples on pages 510 – 520 in textbook.
2. Watch the following videos: ***They are not examples from your book (ignore page numbers), but walks you through examples very similar.

   https://www.youtube.com/watch?v=e_hTvpIfgSk

   https://www.youtube.com/watch?v=xLb_5RPGF38

   https://www.youtube.com/watch?v=neYMCGxELjQ

Packet 15:

1. Complete the following problems on textbook page 522 – 523 problems 36, 38, 40, 42, and 44.

Packet 16:

1. 8.2 Worksheet

8.1 Confidence Intervals: The Basics

Point Estimator: statistic that provides an estimate of a population parameter

Point estimate: value of that statistic from a sample

Example pg. 495-496

Confidence Interval: interval of plausible values for a parameter based on sample data

Confidence level C: gives the overall success rate of the method used to calculate confidence interval

Margin of Error: describes how far, at most, we expect the estimate to vary from the true population value

Example pg. 499

Example pg. 501

8.1 Notes Continued

Check Your Understanding pg. 502

① We are 95% confident that the interval from 0.175 to 0.225 captures the true ~~population~~ proportion of all U.S. adults who would answer the questions correctly.

② If we were to select many random samples of U.S. adults and construct a 95% confidence interval using each sample, about 95% of the intervals would capture the true proportion of all U.S. adults who would answer the question correctly.

③ P.E. $\dfrac{0.175 + 0.225}{2} = 0.20$

M.E. $0.225 - 0.20 = 0.025$

④ Does provide convincing evidence since all plausible values in 95% confidence interval are less than the proportion expected if people were to simply guess from the four choices at random.

8.1 Notes Continued

We prefer an estimate w/ a small margin of error.
M.E. gets smaller when :
 ① Confidence level decreases
 ② Sample size n increases

Critical Value : multiplier that makes the interval wide enough to have the stated capture rate

     * Example pg. 505 *

     pg. 506 - 508

     4, 6, 8, 12, 20

8.1 WS

Losing Weight

A Gallup Poll in November 2014 found that 59% of the people in its sample said "Yes" when asked, "Would you like to lose weight?" Gallup announced: "For results based on the total sample of national adults, one can say with 95% confidence that the margin of (sampling) error is ±3 percentage points."

(a) Explain what the margin of error means in this setting.

(b) State and interpret the 95% confidence interval.

(c) Interpret the confidence level.

The admissions director from Florida International University found that (107.8, 116.2) is a 95% confidence interval for the mean IQ score of all freshmen. **Comment on whether or not each of the following explanations is correct.**

(a) There is a 95% probability that the interval from 107.8 to 116.2 contains μ.

(b) There is a 95% chance that the interval (107.8, 116.2) contains X.

(c) This interval was constructed using a method that produces intervals that capture the true mean in 95% of all possible samples.

(d) 95% of all possible samples will contain the interval (107.8, 116.2).

(e) The probability that the interval (107.8, 116.2) captures μ is either 0 or 1, but we don't know which.

How do Confidence Intervals Change...

(a) How does the shape of the confidence interval change if the confidence level increases from 90% to 95%?

(b) How would the shape of a confidence change if the sample size was decreased? Assume the new, smaller sample size still meets all of the normality conditions.

8.2 Estimating a Population Proportion

One-Sample z Interval For A Population Proport[ion]

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

Conditions For Constructing A Confidence Interval
    About a Proportion
① Random : data from random sample
② 10% Condition : $n < 0.10N$
③ Large Counts : $n\hat{p} \geq 10$ & $n(1-\hat{p}) \geq 10$

Standard Error : when standard deviation of a
    statistic is estimated from data

* Example pg. 513-514*

* Example pg. 516*   - use Calculator

Check Your Understanding pg. 516
① p = true proportion of all US adults who "often"
    or "always" got enough sleep during last 7 nights

② Chosen randomly, $1029 < .10N$, $np = 493.92$,
    $n(1-p) = 535.08$

③ $\frac{1-0.99}{2} = .005$ inv Norm $(.005, 0, 1) = -2.576$
    Calculator : $(.44, .52)$

Example pg. 516

b) STAT → Tests → 1-PropZInt

$x = 1110$

$n = 1520$

$c = .9$

pg. 516 CYU

③ $x = 494$

$n = 1029$ $(.43996, .5202)$

$c = .99$

④ We are 99% confident that the interval from 0.44 to 0.52 captures p = the true proportion of all US adults who would report that they "often or always" got enough sleep during the last 7 nights.

Confidence Intervals 4 Step Process
  State : Parameter and Confidence Level
  Plan : Identify appropriate inference method and check conditions
  Do : Perform Calculations
  Conclude : Interpret interval

* Example pg. 517-518 * — Calculator

Sample Size For Desired Margin of Error
    When Estimating p
  Solve following inequality for n

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

* Margin of Error will always be less than or equal to maximum margin of error ME if you use $\hat{p} = 0.5$

Example pg. 516-517

DO: $x = 170$, $n = 738$, $C = .95$

$(.19997, .26073)$

8.2 Notes Continued

Example pg. 520

Check Your Understanding pg. 520

① invNorm $(.025, 0, 1) = 1.96$

$$1.96 \sqrt{\frac{0.80(0.20)}{n}} \leq .03$$

$$\sqrt{\frac{0.80(0.20)}{n}} \leq \frac{.03}{1.96}$$

$$\frac{.16}{n} \leq \left(\frac{.03}{1.96}\right)^2$$

$$\frac{.16}{\left(\frac{.03}{1.96}\right)^2}$$

$$n \geq 682.9511111$$

683 customers should be selected

② Required sample size will be larger
because critical value is larger for 99%
confidence versus 95% confidence.
1180 customers would have to be selected.

8.2 WS

Kissing the Right Way?

According to an article in the San Gabriel Valley Tribune, "Most people are kissing the 'right way'." That is, according to the study, the majority of couples tilt their heads to the right when kissing. In the study, a researcher observed a random sample 124 couples kissing in various public places and found that 83/124 (66.9%) of the couples tilted to the right. Construct and interpret a 95% confidence interval for the proportion of all couples who tilt their heads to the right when kissing.

Tattoos

Suppose that you wanted to estimate the p = the true proportion of students at your school that have a tattoo with 95% confidence and a margin of error of no more than 0.10. What's the minimum number of students you would need to survey?

How much homework?

Mr. Shinn wants to estimate how much time students spend on homework, on average, during a typical week. He wants to estimate at the 90% confidence level with a margin of error of at most 30 minutes. A pilot study indicated that the standard deviation of time spent on homework per week is about 154 minutes. What's the minimum number of students you would need to survey?