

STEP-BY-STEP INSTRUCTIONS:

Proceed by going over each one of the below steps one at a time:

1. Ask the student to turn to page 99 of the course packet (page 18 of Chapter 8).

Remind the students to write down the answers in the course packet.

2. Explain to the student that we have covered all of Chapter 8 and we will just be going over a few problems to check their knowledge.

3. Introduce the problem: A study suggests that 60% of college students spend 10 or more hours per week communicating with others online. You believe that this is incorrect and decide to collect your own sample for a hypothesis test. You randomly sample 160 students from your dorm and find that 70% spent 10 or more hours a week communicating with others online. A friend of yours, who offers to help with you with the hypothesis test, comes up with the following set of hypotheses.

$H_0: \hat{p} < 0.6$ vs $H_a: \hat{p} > 0.7$

4. Ask the student to identify the errors. Answer: 1. The alternative should have 0.6, not 0.7. 0.7 is a statistics and doesn't belong in the hypotheses. 2. The null hypothesis should have "=" not "<". 3. The null and alternative should have "p" not " $\hat{p}$ ".

5. Introduce the problem: A simple random sample of 1028 US adults in March 2013 show that 56% support nuclear arms reduction. Does this provide convincing evidence that a majority of Americans supported nuclear arms reduction at the 0.05 significance level.

6. Ask the student to: State the null and alternative hypothesis, report the p-value and state a conclusion in context of the problem. Answer: $H_0: p = 0.5$ vs $H_1: p > 0.5$. p-value < 0.0001. We can reject the null and conclude that the majority of US adults support nuclear arms reduction.

7. Introduce the problem: A patient named Diana was diagnosed with Fibromyalgia, a long-term syndrome of body pain, and was prescribed anti-depressants. Being the skeptic that she is, Diana didn't initially believe that anti-depressants would help her symptoms. However after a couple months of being on the medication she decides that anti-depressants are working, because she feels like her symptoms are in fact getting better.

8. Ask the student to : Write the hypotheses in words for Diana's skeptical position when she started taking the anti-depressants.

H_0 : Mediation is not working H_1 : Medication is working

9. Ask the student: What is a Type I Error in this context? Answer: She would conclude that the medication is working when it isn't.

10. Ask the student: What is a Type II Error in this context? She would conclude that the medicine is not working when in fact it is working.

11. Introduce the problem: Determine whether the following statement is true or false and explain your reasoning: With large sample sizes, even small differences between the null value and the observed point estimate can be statistically significant. Answer: Yes, increasing sample size will increase likelihood of rejecting the null even for small differences.

12. Introduce the problem: Georgianna claims that in a small city renowned for its music school, the average child takes less than 5 years of piano lessons. She collects data from 20 children and calculated a sample mean of 4.6 years and a standard deviation of 2.2 years.

13. Ask the student: Evaluate Georgianna's claim using a hypothesis test. Use a significance level of 0.05. Answer: $H_0: \mu=5$ vs $H_1: \mu<5$. P-value=0.2131 We did not find evidence that the city children plays piano on average less than 5 years.

14. Ask the student to construct a 95% confidence interval for the number of years students in this city take piano lessons, and interpret it in context of the data. Answer: We can be 95% confident that, on average, children play piano between 3.57 and 5.63 years.

15. Ask the student: Do your results from the hypothesis test and the confidence interval agree? Explain your reasoning. Answer: Yes, because the confidence interval includes 5 we would not reject the null because the confidence interval is consistent with the null since 5 is included in the interval.

16. Tell the students "Great job. You are now ready to move on to the next section of notes. Make sure you have completed the fill in the blank spots on your notes. Would you like me to create a download .pdf file of this chat that is aligned with your guided notes?"

17. Create a downloadable .pdf file for the student if they request one.