

# Week 11 Homework Problems

Complete the homework problems and submit to the appropriate drop box. You may work directly on this document or do you work on a separate document. Either way, be sure to show the complete testing process (including relevant statistical output) when asked to complete a hypothesis test. That is, you will only earn credit if you show the population, method, sample, results and conclusions steps.

## Part A: Multiple-Choice

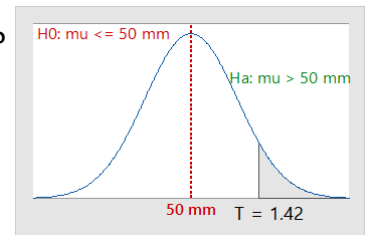
1. School district officials believe that students spend plenty of time reading at home. A teacher wants to convince these officials that, on average, students spend less than 90 minutes per week reading at home.

**What is the alternative hypothesis?**

- a.  $H_a: p < 0.90$
- b.  $H_a: p > 0.90$
- c.  $H_a: \mu > 90$
- d.  $H_a: \mu < 90$

2. Which statement provides a correct interpretation of the value of T test statistic?

- a. My  $\bar{X}$  is 1.42 standard errors above 50.
- b. My  $\bar{X}$  is 1.42 mm above 50.
- c. My  $\bar{X}$  is 1.42 times as large as 50.
- d. My  $\bar{X}$  equals 1.42 mm.



3. When the probability value for the sample is “small” in a test of hypotheses, this tells us that our sample mean is \_\_\_\_\_.

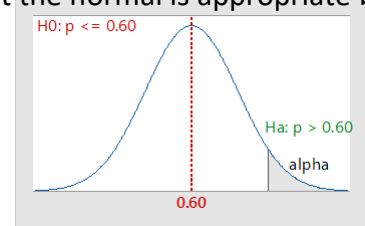
- a. unusual for the curve.
- b. typical for the curve.
- c. computed incorrectly.
- d. below the center of the curve.

4. If your sample had sufficient evidence to reject  $H_0$ , there is a small chance that a \_\_\_\_ occurred.

- a. large probability value
- b. Type I error
- c. Type II error
- d. correct decision

5. When testing the hypotheses  $H_0: p = 0.60$  and  $H_a: p > 0.60$ , you check that the normal is appropriate by showing that

- a.  $p \geq 10$
- b. you have a random sample
- c.  $n \geq 30$  OR NPP P-value  $> .05$
- d.  $n(0.60)(1 - 0.60) \geq 10$



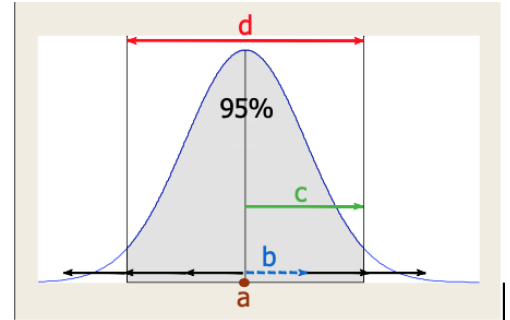
6. Researchers will create a confidence interval for the proportion of all first-grade children who are overweight. The chance that this method will provide a correct result is determined by the

- a. sample size.
- b. level of confidence.

- c. sample mean.
- d. population standard deviation.

7. See the confidence interval diagram. The margin of error is represented by

- a. the dot labelled "a".
- b. the dashed arrow labelled "b".
- c. the arrow labelled "c".
- d. the double arrow labelled "d".



8. A 95% confidence interval for the average speed of drivers on the New York State Thruway is: (65 mph, 75 mph). What is the value of the point estimate?

- a. 65 mph
- b. 5 mph
- c. 10 mph
- d. 70 mph

9. When creating a confidence interval for a numerical variable, you check that the "t-curve" is appropriate to use by showing that

- a. you have a random sample
- b.  $n \geq 30$  OR NPP P-value  $> .05$
- c.  $n \geq 10$
- d.  $np(1 - p) \geq 10$

10. A 95% confidence interval for the percentage of all Rochester area drivers who text while driving is (35%, 43%). Which statement is reasonable based on the CI result?

- a. The percentage of Rochester area drivers who text while driving is equal to 37%.
- b. The percentage of Rochester area drivers who text while driving is equal to 34%.
- c. The percentage of Rochester area drivers who text while driving is equal to 30%.
- d. The percentage of Rochester area drivers who text while driving is equal to 48%.

11. Based on a random sample of fifty full-time college students, we can be 90% confident that for all college students the mean time spent studying per week is between 9.25 hours and 10.75 hours.

Which interval (a – d) is a 95% confidence interval for the same sample?

- a. (9.10, 10.90)
- b. (9.30, 10.70)
- c. (9.45, 10.55)
- d. (9.00, 10.50)

12. If you want to estimate the proportion of all RIT students who smoke within 0.05 with 90% confidence, what is the minimum sample size you will need?

- a. 1562
- b. 2033
- c. 271

13. We are 95% confident that during October 2016 the mean water usage for all Rochester households was between 1250 and 1350 cubic feet.

In which statement can you have 95% confidence?

- a. Mean water usage is greater than 1300 cubic feet.
- b. Mean water usage is less than 1400 cubic feet.
- c. Mean water usage is between 1200 and 1300 cubic feet.
- d. Mean water usage is less than 1300 cubic feet.

### Part B: Test and CI

14. It is commonly thought that very few U.S. adults believe in reincarnation (the rebirth of a soul in a new body). But a researcher thinks that group has been growing and wants to convince others that the percentage who believe in reincarnation is greater than 20%. In the researcher's random sample of 942 U.S. adults, 195 stated that they believe in reincarnation. Does the researcher's sample provide sufficient evidence to support the idea that more than 20% of all U.S. adults believe in reincarnation? Show the complete testing process and always include your statistical output.

15. How much caffeine is in *King of Caffeine* cola? A dozen randomly selected cans of *King of Caffeine* cola had these caffeine (mg) values. The data can be found in the file: 11\_Week 11 STAT 145 Data.xlsx under the sheet: **Caffeine**.

34.2	33.7	31.9	34.3	31.2	32.7
33.1	35.2	31.6	32.9	33.0	32.4

A. Estimate the mean caffeine level among all cans of *King of Caffeine* cola with 95% confidence.

B. What minimum sample size would be needed to estimate the mean caffeine level within 0.4 mg with 95% confidence? SHOW YOUR WORK.