

Do teenagers get enough sleep? Doctors recommend that teenagers get an average of nine hours of sleep each night. Suppose a random sample of teenagers produced the following results:

	Get enough sleep	Do not get enough sleep
Seniors	8	34
Underclassmen	14	33

$$\begin{aligned}\bar{x}_S &= 6.8095 \text{ (hours/night)} & \bar{x}_U &= 7.2766 \text{ (hours/night)} \\ s_S &= 1.5334 \text{ (hours/night)} & s_U &= 1.4993 \text{ (hours/night)}\end{aligned}$$

For problems 1-11, choose the most appropriate response to complete the statement.

1. One- and two-sample z-procedures for sample proportions are used with \_\_\_\_\_ data.
  - a. discrete
  - b. continuous
  - c. categorical
  - d. quantitative
  - e. subspace
2. One- and two-sample t-procedures are used with \_\_\_\_\_ data.
  - a. discrete
  - b. continuous
  - c. categorical
  - d. quantitative
  - e. transporter
3. A statistic is a calculation based on \_\_\_\_\_.
  - a. population data
  - b. sample data
  - c. a normal distribution
  - d. a t-distribution
  - e. a holodeck simulation
4. A \_\_\_\_\_ is a measure that describes a population.
  - a. parameter
  - b. statistic
  - c. normal distribution
  - d. t-distribution
  - e. tribble
5. \_\_\_\_\_ determines the boundary for rejecting the null hypothesis.
  - a. The test statistic
  - b. Alpha
  - c. Beta
  - d. The power
  - e. The neutral zone

6. In a two-sample test for means, samples must \_\_\_\_\_.
- contain at least ten subjects
  - be independently chosen
  - be larger than ten percent of the population
  - be pooled
  - contain a betazoid
7. Finding \_\_\_\_\_ involves subtracting the mean of the sampling model and dividing by its standard deviation (or standard error).
- alpha
  - beta
  - the power
  - the test statistic
  - a cloaking device
8. When conducting a hypothesis test, the standardized value \_\_\_\_\_.
- lies above the upper critical value
  - lies below the lower critical value
  - is the margin of error
  - is the test statistic
  - is powered by dilithium crystals
9. The probability that our sample produces a statistic at least as extreme as the one we observed is \_\_\_\_\_.
- the p-value
  - the margin of error
  - the critical value
  - the test statistic
  - cause for red alert
10. When we make a generalization about a population based on sample data, we \_\_\_\_\_.
- conduct an experiment
  - perform inference
  - interpolate
  - extrapolate
  - set phasers to stun
11. A p-value is used to show that \_\_\_\_\_ is too unlikely to have occurred by chance.
- an observed value
  - the margin of error
  - the alternative hypothesis
  - the null hypothesis
  - a warp core breach

For problems 12-20, choose which procedure you would use to answer the question. (*Think: Am I testing proportions or means? Is it a one- or two-sample problem? Should I use a hypothesis test or a confidence interval?*) You may repeat answers, but choose only one answer for each question (although more than one letter may be appropriate).

- |                                      |  |
|--------------------------------------|--|
| f. One-sample z-test for proportions | k. One-sample z-interval for proportions |
| g. Two-sample z-test for proportions | l. Two-sample z-interval for proportions |
| h. One-sample t-test for means       | m. One-sample t-interval for means       |
| i. Two-sample t-test for means       | n. Two-sample t-interval for means       |
| j. Paired t-test                     | o. Paired t-interval                     |

12. Do teenagers get enough sleep? \_\_\_\_\_
13. Do underclassmen get more sleep than seniors? \_\_\_\_\_
14. Do seniors get enough sleep? \_\_\_\_\_
15. About how many hours of sleep do seniors get per night? \_\_\_\_\_
16. About how many more hours of sleep per night do underclassmen get than seniors? \_\_\_\_\_
17. What is the difference in the percent of seniors who get enough sleep and the percent of underclassmen who get enough sleep? \_\_\_\_\_
18. What percent of seniors get enough sleep? \_\_\_\_\_
19. Are underclassmen more likely to get enough sleep than seniors? \_\_\_\_\_
20. Do teenagers get fewer than 8 hours of sleep per night? \_\_\_\_\_

Use the information given in the following conclusions to answer problems 21-25.

If there were no difference between the average number of hours slept per night by seniors and underclassmen, we would expect a sample difference at least as extreme as 0.467 hours in about 8 out of every 100 samples due to chance variation. This is not strong enough evidence to conclude that seniors get less sleep than underclassmen.

21. State the p-value. \_\_\_\_\_
22. State the null hypothesis. \_\_\_\_\_
23. State the alternative hypothesis. \_\_\_\_\_

We are 95% confident that seniors, on average, sleep between about of 1.1 hours less than and 0.2 hours more than underclassmen per night, because 95% of all samples of sizes 42 and 47 will produce an observed difference within about 0.65 hours of the true difference.

24. Find the margin of error. \_\_\_\_\_
25. State the confidence interval. \_\_\_\_\_