

1. The inference procedure for testing a claim about a difference of means is called a “two-sample t -test for $\mu_1 - \mu_2$ ”.
 - a. Why does the name of the procedure include “two-sample”?
 - b. Why does the name of the procedure include “ t ”?
 - c. Why does the name of the procedure include “test”?
 - d. Why does the name of the procedure include “for $\mu_1 - \mu_2$ ”?

2. The U.S. Bureau of Labor Statistics conducted a time-use survey and found that adults in households with the youngest child under 6 years old spent an average of 3.36 hours per day on leisure and sports. For adults in households with the youngest child between 6 and 17 years old, the mean number of hours spent per day on leisure and sports was 3.76 hours. The survey was completed by 8,100 randomly selected adults.
- Write a research question that could be answered with a two-tailed two-sample t -test.
 - State the hypotheses for this test. Be sure to define the parameter.
 - Write a research question that could be answered with a one-tailed two-sample t -test.
 - State the hypotheses for this test.
3. In a study of typing speeds, randomly selected full-time workers from various industries were asked to take a one-minute typing test. For the 41 participants in the legal sector, the average typing speed was 60.6 words per minute. For the 76 participants in the education sector, the average typing speed was 56.3 words per minute. Suppose you wanted to perform a test to see if there is a statistically significant difference in the average number of words per minute typed by all individuals in the legal sector and all individuals in the education sector. Check the appropriate conditions for performing the test.

4. A pharmaceutical company performed a clinical trial comparing two cholesterol-lowering treatments for patients with hypercholesterolemia. Treatment A was a traditional statin medication and Treatment B was a newly developed drug. Volunteers were randomly assigned to one of the treatments for six months, after which their cholesterol levels were measured. Summary statistics for both treatment groups are shown:

Treatment A ($n = 30$) :

Mean Cholesterol Level: 210 mg/dL

Standard Deviation: 15 mg/dL

Treatment B ($n = 35$) :

Mean Cholesterol Level: 205 mg/dL

Standard Deviation: 18 mg/dL

Suppose the company wanted to perform a statistical test to determine if the new drug is more effective at lowering cholesterol levels at a 5% level of significance.

- a. Classify the type of variables and type of study.
- b. Choose the appropriate inference procedure.
- c. Define the parameter.
- d. State the appropriate hypotheses.
- e. Calculate the statistic. Use appropriate notation.
- f. Is there some evidence for the alternative hypothesis? Explain.

5. In a study of K-12 math classrooms, 41 student groups were randomly assigned to work either at a vertical whiteboard or on paper at their desk. Researchers recorded each group's time (in seconds) to begin a task. Which hypotheses should be used to test whether the true mean start time is less for groups using vertical whiteboards compared to groups using paper at their desks? Assume all conditions for inference are met.
- A) $H_0 : \mu_{\text{whiteboard}} < \mu_{\text{paper}}, H_a : \mu_{\text{whiteboard}} = \mu_{\text{paper}}$
- B) $H_0 : \mu_{\text{whiteboard}} = \mu_{\text{paper}}, H_a : \mu_{\text{whiteboard}} \neq \mu_{\text{paper}}$
- C) $H_0 : \mu_{\text{whiteboard}} = \mu_{\text{paper}}, H_a : \mu_{\text{whiteboard}} > \mu_{\text{paper}}$
- D) $H_0 : \mu_{\text{whiteboard}} = \mu_{\text{paper}}, H_a : \mu_{\text{whiteboard}} < \mu_{\text{paper}}$
6. To investigate whether holding a Superman pose for 30 seconds affects test scores, Pamela has Ms. Smith's Algebra 1 class hold the pose before a unit test while Mr. Gonzalez's Algebra 1 class takes the same test without holding the pose. There are 32 students in each class. She calculates the mean test score for each class and wants to perform a two-sample t -test for a difference in means. Which statement best explains whether this inference procedure is appropriate?
- A) The inference procedure is not appropriate because we cannot assume a sampling distribution that is approximately normal.
- B) The inference procedure is not appropriate because the treatment of holding the Superman pose was not randomly assigned.
- C) The inference procedure is not appropriate because Pamela should be using a two-sample z -test, rather than a two-sample t -test.
- D) The inference procedure is appropriate because the sample size is larger than 30.