A Pew Research Center report from 2012 finds that the average commute time to work in CA is 27.5 minutes. A high school student wonders if the commute time in her own community might be different, so she interviews 45 people she knows in her community (parents, teachers, business people, and such) and finds that the average commute time to work for this sample is 24.33 minutes, with a standard deviation of 9.53 minutes. What can we conclude from this data?


We will conduct a \textit{t-test for a population mean}.

\textbf{HT}

1. State the research question.

2-4. Report the values of the sample statistics.

If necessary, use the \textbf{Descriptive Statistics} applet to calculate the mean, standard deviation, and sample size of the data.

\[ \bar{x} = \]

\[ s = \]

\[ n = \]

5-8. Define \( \mu \), state the appropriate hypotheses, and report the value of \( \mu \).

Define \( \mu \).

\[ H_0 : \]

\[ H_a : \]

\[ \mu = \]

9. State the level of significance.

\[ \alpha = \]
Verify conditions.

10. **Shape. Is the sample distribution not strongly skewed?**
11. **Size. Is \( n \geq 20 \)?**
12. **Are the necessary conditions satisfied for a theory-based analysis? Explain.**

13-14. Use the Theory-based Inference applet to determine the values of the standardized test statistic, \( t \), and \( p.value \). Send in a screenshot of the applet labeled *commute* showing all appropriate values.

\( t = \)

\( p.value = \)

When the required conditions hold for theory-based inference,

\[ T \sim t(df = n - 1) \]

and the numerical value of \( p.value \) depends on the form of the alternative hypothesis:

- for an upper-tailed test,
  \[ p.value = P(T \geq t) \]
- for a lower-tailed test,
  \[ p.value = P(T \leq t) \]
- and for a two-tailed test,
  \[ p.value = P(|T| \geq |t|) \]

15. **Which of the three formulas for \( p.value \) is the correct one to use for this particular investigation?**

Possible answers for question 15 include

A. upper-tailed test  
B. lower-tailed test  
C. two-tailed test

16. **Illustrate the appropriate null distribution and its relationship to \( t \) and \( p.value \).**
This is usually included as part of an applet’s display.

17. **Evaluate the strength of evidence against the null hypothesis indicated by \( p.value \).**

\[ strength = \quad not \ much \quad 0.10 \quad moderate \quad 0.05 \quad strong \quad 0.01 \quad very \ strong \]

18. **State the formal conclusion of this HT.**

( R ) I reject the null hypothesis  
( F ) I fail to reject the null hypothesis

19. **Justify your formal conclusion.**
20. Can we infer that this conclusion applies to any population larger than the sample? If so, to which population? Why?

21. Conclusion in context. What does this HT tell you about the research question? Be sure to include your level of confidence in your statement.

22-23. Reserved for supporting applet image(s).