

Researchers who study bats are interested in the the distance a specific species of bats in a certain location must fly to feed. In an experiment, twenty-five male bats and twenty-five female bats are tagged and tracked by radio. You may treat these samples as having been randomly selected from the very large populations of all male and female bats of this species in this location. For each sampled bat, the average distance (in meters) of a feeding pass is measured. Summary data are shown here.

Sex	Sample Size	Sample Mean	Sample Standard Deviation
Female	25	205	100
Male	25	135	95

One possible explanation for larger mean distances for females is that the males are more aggressive and drive the females away from the nearby feeding areas. There are 48 degrees of freedom. Please answer the first two problems on the back of the page.

- (a) Construct a 95% confidence interval for the difference between the two population mean distances (female minus male) per feeding pass. Interpret the confidence interval in the context of the problem.
- (b) Test the hypothesis that the two population means are equal versus a one-sided alternative. State hypotheses, calculate a test statistic, identify the degrees of freedom, and report a p-value (with a range).
- (c) Circle the numbers of all correct statements about the population of bats of the given species and location in the study. (There may be more than one correct response.)
 - 1. It is absolutely certain that female bats fly farther than male bats on average during feeding passes.
 - 2. There is fairly strong evidence that female bats fly farther than male bats on average during feeding passes.
 - 3. There is fairly strong evidence that male bats force female bats away from nearby feeding areas.
 - 4. The data is consistent with the hypothesis that male bats and female bats fly the same distance on average during feeding passes.
 - 5. Batgirl flies farther than Batman.

For each problem, circle TRUE or FALSE. If FALSE, either correct the statement or briefly explain why it is false.

(d) TRUE or FALSE:

A 95% confidence interval for p has a margin of error of 0.24. A sample size twice as large is necessary to decrease the margin of error to about 0.12.

(e) TRUE or FALSE:

A 95% confidence interval for the mean number of children of 40-year-old American women cannot be (1.7, 1.9) because the number of children each woman has is a whole number.

(f) TRUE or FALSE:

If a hypothesis test is significant at the 5% level, the p-value must be smaller than 0.05.

(g) TRUE or FALSE:

A p-value of 0.02 means that there is only a two percent chance that the null hypothesis is correct.