

A.P. Statistics
Assignment 8.5

Remember to show your thinking through your work.

- 1) Below is the formula we used to find the standard error of the mean for a single sample. Copy and paste the formula into the answer box and adjust it to find the standard error of the mean for the 2-sample interval.

$$SE = \frac{s}{\sqrt{n}}$$

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- 2) Below is the formula we used to construct a 1-sample confidence interval for t. Copy and paste the formula into the answer box and adjust it to construct the 2-sample interval.

$$\bar{x} \pm t * \frac{s}{\sqrt{n}}$$

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- 3) A matched pairs design is treated as one sample for intervals and testing purposes despite there being two samples taken. Explain.

- 4) The following situations all require inference about a mean or means. Identify each as (1) a single sample, (2) matched pairs, or (3) two independent samples.
- (a) An education researcher wants to learn whether inserting questions before or after introducing a new concept in an elementary school mathematics text is more effective. He prepares two text segments that teach the concept, one with motivating questions before and the other with review questions after. Each text segment is used to teach a different group of children, and their scores on a test over the material are compared.

- (b) Another researcher approaches the same problem differently. She prepares text segments on two unrelated topics. Each segment comes in two versions, one with questions before and the other with questions after. Each of a group of children is taught both topics, one topic (chosen at random) with questions

before and the other with questions after. Each child's test scores on the two topics are compared to see which topic he or she learned better.

- (c) To evaluate a new analytical method, a chemist obtains a reference specimen of known concentration from the National Institute of Standards and Technology. She then makes 20 measurements of the concentration of this specimen with the new method and checks for bias by comparing the mean result with the known concentration.

- (d) Another chemist is evaluating the same new method. He has no reference specimen, but a familiar analytic method is available. He wants to know if the new and old methods agree. He takes a specimen of unknown concentration and measures the concentration 10 times with the new method and 10 times with the old method.

- 5) The Johns Hopkins Regional Talent Searches give the SAT (intended for high school juniors and seniors) to 13-year-olds. In all, 19,883 males and 19,937 females took the tests between 1980 and 1982. The mean scores of males and females on the verbal test are nearly equal, but there is a clear difference between the sexes on the mathematics test. The reason for this difference is not understood. Here are the data.

Group	\bar{x}	s
Males	416	87
Females	386	74

Give a 99% confidence interval for the difference between the mean score for males and the mean score for females in the population that Johns Hopkins searches.

- 6) Lisa wants to compare the cost of one- and two-bedroom apartments in Spokane. She collects data for a random sample of 10 advertisements of each type. Here are the rents for the two-bedroom apartments (in dollars per month):

595 500 580 650 675 675 750 500 495 670

Here are the rents for the one-bedroom apartments:

500 650 600 505 450 550 515 495 650 395

Find a 95% confidence interval for the additional cost of a second bedroom.

7) A market research firm supplies manufacturers with estimates of the retail sales of their products from samples of retail stores. Marketing managers are prone to look at the estimate and ignore sampling error. Suppose that an SRS of 75 stores this month shows mean sales of 52 units of a small appliance, with standard deviation 13 units. During the same month last year, an SRS of 53 stores gave mean sales of 49 units, with standard deviation 11 units. An increase from 49 to 52 is a rise of 6%. The marketing manager is happy, because sales are up 6%.

- (a) Use the two-sample t procedure to give a 95% confidence interval for the difference in mean number of units sold at all retail stores.

- (b) Explain in language that the manager can understand why he cannot be certain that sales rose by 6%, and that in fact sales may even have dropped.