

# Classroom Voting Questions: Statistics

## Comparing Two Means

1. You are trying to decide whether to use a pooled  $t$ -test or a nonpooled  $t$ -test to compare two population means. Which of the following statements is not true?
  - (a) If the population standard deviations are very different, the Type I error probability can be much larger than the specified level for the pooled  $t$ -test.
  - (b) If the population standard deviations are somewhat different, the pooled  $t$ -test is preferable if the sample sizes are very different.
  - (c) If the population standard deviations are nearly the same, the pooled  $t$ -test is more powerful than the nonpooled  $t$ -test.
2. Thirty people suffering from obesity sign up to be subjects in a clinical trial. The subjects are weighed and then given a promising new supplement to take daily for six weeks. At the end of the six weeks, the subjects are weighed again. Which test is more appropriate?
  - (a) pooled  $t$ -test
  - (b) paired  $t$ -test
3. Two methods are used to predict the shear strength for steel plate girders. Each method is applied to nine specific girders and the ratio of predicted load to observed load is calculated for each method and each girder. What kind of  $t$ -test should we use to compare these data?
  - (a) Independent  $t$ -test
  - (b) Paired  $t$ -test
4. Two catalysts are being analyzed to determine how they affect the mean yield of a chemical process. Catalyst 1 is used in the process eight times and the yield in percent is measured each time. Then catalyst 2 is used in the process eight times and the yield is measured each time. What kind of  $t$ -test should be used to compare these data?
  - (a) Independent  $t$ -test
  - (b) Paired  $t$ -test

5. Six river locations are selected and the zinc concentration is determined for both surface water and bottom water at each location. What kind of  $t$ -test should be used to compare these data?
- (a) Independent  $t$ -test
  - (b) Paired  $t$ -test
6. We want to know if residents of Missoula have more life insurance than residents of Great Falls. We randomly select 100 Missoula residents and 100 Great Falls residents, finding that the Missoulians have an average of \$125,000 of coverage, while the Great Falls residents have an average of \$110,000 of coverage. We then use the  $t$  distribution to calculate a two-tailed  $p$ -value based on  $H_0 : \mu_1 = \mu_2$ . We find that  $p = 0.16$ . What do we conclude?
- (a) On average, Missoula residents have more life insurance than Great Falls residents.
  - (b) On average, Missoula residents have less life insurance than Great Falls residents.
  - (c) On average, Missoula residents have the same amount of life insurance as Great Falls residents.
  - (d) The average amount of life insurance that Missoula residents have is not different from Great Falls residents.
  - (e) This data doesn't tell us whether or not Missoula residents have more life insurance than Great Falls residents, on average.
  - (f) This is not the correct way of analyzing this data.
7. Was the weather last summer hotter than the previous summer? We look up the temperature at noon every day for a week in June during last summer, and for a week in June during the previous summer. We find that the average temperature from last summer was  $81^\circ$ , while the average temperature from the previous summer was  $75^\circ$ . We then use the  $t$  distribution to calculate a two-tailed  $p$ -value based on  $H_0 : T_1 = T_2$ . We find that  $p = 0.0014$ . What do we conclude?
- (a) On average, last summer was hotter than the previous summer.
  - (b) On average, last summer was less hot than the previous summer.
  - (c) On average, last summer was equally hot as the previous summer.
  - (d) This data doesn't tell us whether or not last summer was hotter than the previous summer, on average.
  - (e) The average temperature last summer was different from the previous summer.