

Name: \_\_\_\_\_  
Quiz 4

MAT 222  
Spring 2017

**Problem 1:** Mark the following statements as true or false in the blank space provided. If the statement is false, explain why it is false.

(a) \_\_\_\_\_: A computer will always give the degrees of freedom for a two-sample  $t$  procedure with sample sizes  $n_1$  and  $n_2$  as  $\min\{n_1 - 1, n_2 - 1\}$ .

(b) \_\_\_\_\_: Given a sample size of less than 15 people from a distribution with unknown standard deviation, the population distribution has to be normal or have no outliers/skewness to use one-sample  $t$  procedures.

(c) \_\_\_\_\_: The standard error for a pooled  $t$ -procedure with two equal size samples is the same as the average of the standard deviations of the samples.

(d) \_\_\_\_\_: Given two samples from a distribution with unknown standard deviation, a two-sample  $t$  procedure must be used.

(e) \_\_\_\_\_: A two-sample  $t$  statistic has a  $t$  distribution.

**Problem 2:** A drinks company has created a new caffeine based energy drink to compete with a rival company whose energy drinks provide a longer 'energy boost.' To be sure they have succeeded, the company's scientists test 16 of their new drinks and find a mean of 11.2 hours of 'energy boost' with standard deviation 2.3, and test 13 of their competitor's beverages, finding an average of 10.8 hours of 'enhanced energy' with standard deviation 2.5. Assuming that the 'enhanced energy period' for both drinks is normally distributed with approximately equal standard deviations (because they use a similar brewing recipe):

(a) Find a 90% confidence interval for the difference in 'extra energy' time.

(b) Find the  $t$  statistic and  $p$ -value for hypothesis that these scientists have designed a drink which provides a longer 'energy boost' than their competitor's drink.

(c) State your conclusion at the  $\alpha = 0.05$  level.