

Note: You must attach a copy of the JMP output for both problems to obtain full credit.

1. Eleven people diagnosed as being dependent on caffeine were subjects in a study. During the study, they were barred from coffee, colas, and other substances containing caffeine. Instead, during the first time period, they were randomly assigned to take either (1) capsules containing their normal caffeine intake, or (2) placebo capsules with no caffeine. During the second time period, they were assigned to the other treatment group. The subjects did not know when they got each pill. Subjects were assessed on the Beck Depression Inventory, which is a psychological test that measures depression. Higher scores on the test mean the subject shows more symptoms of depression. Data from this study can be found in the file **Caffeine Depression.jmp**.

The research question is as follows: *Does depriving caffeine-dependent people of caffeine cause them to become more depressed?*

- a. Explain why a paired-test (for dependent samples) is appropriate for investigating this research question. (1 pt)

- b. Set up the null and alternative hypotheses to test the research question. (2 pts)

H₀:

H_a:

- c. Use a paired t-test to address the research question. Include in your solutions both the p-value and a conclusion in context of the problem. (3 pts)

p-value: _____

Conclusion:

d. Are there any assumptions that must be met in order to use the paired t-test? If so, state these conditions and discuss whether these conditions have been met. (1 pt)

e. Use JMP to find the 95% confidence interval for the mean difference between depression scores in the caffeine and placebo groups. Interpret this interval. (3 pts)

Lower endpoint: _____

Upper endpoint: _____

Interpretation:

2. Researchers count the number of breeding horseshoe crabs on beaches on Delaware Bay every year; the data from 2011 and 2012 are given in the file **HorseshoeCrabs.jmp**. Note that the number of horseshoe crabs found on each beach is given for both years.

The research question is as follows: *Has the number of horseshoe crabs changed from 2011 to 2012?*

- a. Explain why a paired-test (for dependent samples) is appropriate for investigating this research question. (1 pt)

- b. Set up the null and alternative hypotheses to test the research question. (2 pts)

H₀:

H_a:

- c. Use an appropriate hypothesis testing procedure to address the research question. Include in your solutions both the p-value and a conclusion in context of the problem. (3 pts)

p-value: _____

Conclusion:

d. Are there any assumptions that must be met in order to use the hypothesis testing procedure you used in part c? If so, state these conditions and discuss whether these conditions have been met. (1 pt)

e. Use JMP to find the 95% confidence interval for the mean difference between the number of horseshoe crabs found from 2011 to 2012. Interpret this interval. (3 pts)

Lower endpoint: _____

Upper endpoint: _____

Interpretation: