BIO 206 Spring 2021

Assignment 13—Questions from Chapter 12 “Comparing Two Means”, Part 2

**Due Mon., May 17 at 11:59 pm**

(45 pt)

* Please type your final answers to the problems on the main pages of your assignment. After the pages with typed answers, attach handwritten pages showing your calculations. On the pages of calculations, clearly indicate the problem numbers and final answers. Don't use computers for the analyses unless the problems say to.
* Directions for reporting results of statistical tests---on the typed pages, report:

--The means of each group

--n (sample size)

--degrees of freedom

--alpha (Threshold level of significance. Decide on the value before doing the statistical test. The default is to test at alpha = 0.05, meaning at the 5% significance level.)

--the name and value of the test statistic (Example: X2 value = 0.55)

--p-value (from a table of critical values in the back of the textbook)

--Describe your conclusion in a sentence. (Example 1: “Births are not evenly distributed over the days of the week.” Example 2: “The proportion of wild-type flies was significantly greater than expected by the 3:1 ratio.” Example 3: “The proportions of people who are interested in each of the five areas of psychology are significantly different.”

* For practice problems, please write an answer in your own words before checking your answer against the solutions in the back of the book. Then, compare the solution to your answer. If your answer wasn't correct, don't change it--write about how the solution in the book differed from your answer and why it's correct. In other words, show evidence that you are thinking independently and learning. In this way, you can get full credit even if you originally didn't have the correct answer.
* On graphs, include:
  + Your name
  + The assignment and number to the problem
  + Include labels on the axes.
  + Include units. Examples of units: cm or sec.
  + Above or below the graph, write a figure legend that describes what data are in the graph. Include the sample size in the legend. See Endres and Lohmann (2012) fig 2 and fig 3 for examples. This article is in the folder “Assignments”. Reading the whole article won’t be part of this course—just look at the design of the graphs and legends. These graphs have standard error bars, which are not part of histograms.
  + At the end of the figure legend, write in parentheses the names of the authors and year published for the source of the data—you don't want to represent the data as your own. Example of citation: (data from Cratsley and Lewis (2003)). The authors for the data are listed in problems. It's really important to make it clear that data aren't yours if you're showing them to other people.

Assignment Problems, Chapter 12

**Directions for Vassarstats:** Go to VassarStats.net >>T-tests & Procedures>>Two sample t-test for independent or correlated samples

Use “independent samples” when the observations in the two columns aren’t related (unpaired t-test). Use “correlated samples” for a paired t-test, such as when giving people a pre-test and a post-test. From an Excel file, copy and paste each column of data into the box labeled "Data Entry" in VassarStats. Make sure that the cursor ends next to a number, not on a new row, which would be interpreted as a “0”.

“Nondirectional alternative” is the same as “two-tailed”. “Directional” is the same as “one-tailed”.

26b (3 pt)

26c (8 pt) Use Vassarstats. Follow the directions for statistical tests. See D2L in the folder “Datasets for Assignments” for data file.

26d (2 pt)

27a (6 pt) Use Excel. See directions on graphing for Assignment 3. Create a graph that is the correct type for the data. See the handout “Matching variables with graphs and analyses table” in “Copies of handouts” on D2L.

27b (8 pt) Use Vassarstats. Follow the directions for statistical tests. See D2L in the folder “Datasets for Assignments” for data file.

Question not from book: Polyandry is the name given to a mating system in which females mate with more than one male in a breeding season. This mating system leads to competition for fertilization between sperm of different males. The prediction has been made that males in polyandrous populations should evolve larges testes than males in monogamous populations (where females mate with only one male), because larger testes produce more sperm. To test this prediction, researchers carried out an experiment on eight separate lines of yellow dung flies (Hosken and Ward 2001). In four of these lines, each female was mated with three males before laying eggs (the polyandrous populations). In the other four lines, the females mated only once. After 10 generations, the testes size in cross-sectional area was measured in each of these lines. The data are as follows:

|  |  |
| --- | --- |
| Mating System | Testes area (mm2) |
| Monogamous | 0.83 |
| Monogamous | 0.85 |
| Monogamous | 0.82 |
| Monogamous | 0.89 |
| Polygamous | 0.96 |
| Polygamous | 0.94 |
| Polygamous | 0.99 |
| Polygamous | 0.91 |

Question not from book a) (2 pt) What is the difference in mean testes size for males from monogamous populations compared to males from polyandrous populations?

Question not from book b) (10 pt) Are the testes of polygamous flies significantly larger than testes from monogamous flies? Assume normality and equal variances.

Do by hand and show your work. Follow the directions for statistical tests. Don't use Excel, but do follow the design for calculations that we used for the puppy example in class. You can attach pages with hand-written calculations. (Keep about three significant digits or else the rounding errors magnify when squared.)

Question not from book c) (6 pt) Using Excel, draw a graph that is correct type for the data for testes size. See the handout “Matching variables with graphs and analyses table” in “Copies of handouts” on D2L.

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At the end of your paper, please write “Number of hours I spent on this homework:” and add an estimate. Don’t include time that you spent reading the chapter. This number won’t affect your grade.