

You may work with one partner on this assignment, submitting one report with both names, provided that both students contribute substantially to the work. Word-processed reports are preferred to hand-written ones. Integrate computer output into your report as appropriate.

Marriage Ages

A student of mine (when I taught in Pennsylvania) investigated whether husbands tend to be older than their wives. He gathered data on the ages of a sample of 24 couples, taken from marriage licenses filed in Cumberland County, Pennsylvania, in June and July of 1993. These data can be accessed in a file `MarriageAges.txt` from our course's "Data and Applets" page.

- a) For each couple, calculate the difference in ages (taking the husband's age minus the wife's age). Produce and comment on a dotplot of these differences, keeping in mind the research question of whether husbands tend to be older than their wives.
- b) State the null and alternative hypotheses (in symbols) for testing whether the sample data support the research conjecture that husbands tend to be older than their wives.
- c) Copy/paste the data into the Matched Pairs Randomization applet, and perform 1000 repetitions of the randomization. Submit a copy of the resulting dotplot of sample mean differences. Also use the simulation results to determine an empirical p-value.
- d) Describe what the empirical p-value in c) represents (it's the probability of what?), and summarize the conclusion that you draw from it.
- e) Investigate and comment on whether the technical conditions of a paired t -test appear to be satisfied here.
- f) Calculate the paired t -test statistic and p-value. Would you reject the null hypothesis at the .05 significance level?
- g) Produce and interpret a 90% confidence interval for the population mean difference in ages between a husband and wife.
- h) Produce and interpret a 90% prediction interval for the difference in age between a husband and wife.