HW9: Brain size and schizophrenia? (assigned on Tues Feb 24; due on Thur Feb 26)
You may work with in a group of as many as three students on this assignment, handing in one report with all names, provided that you all contribute to the work. Word-processed reports are preferred to hand-written ones. Integrate computer output into your report as appropriate.

Researchers are often looking for physiological differences that can help to predict susceptibility to diseases. We will examine data on the volume (in cubic centimeters) of the hippocampus region of the brain for 15 pairs of identical twins, one of whom suffered from schizophrenia and one of whom did not. The data are available in a text file called hippocampus.txt.

a) Report the appropriate hypotheses for testing whether the data suggest that the mean volumes of the hippocampus region differ between those with schizophrenia and those without.

b) Copy/paste the data into the Matched Pairs Randomization applet. Submit a dotplot of the differences. Also report the mean and standard deviation of these differences, along with appropriate symbols.

c) Comment on what the graph and statistics in c) reveal about the research question.

d) 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.

e) Summarize your conclusion from this simulation analysis.

f) Investigate and comment on whether the technical conditions of a paired $t$-test appear to be satisfied.

g) Calculate the paired $t$-test statistic (by hand) and p-value. Would you reject the null hypothesis at the .05 significance level?

h) Determine and interpret a 95% confidence interval for the mean difference in hippocampus volumes between the two kinds of twins.

i) Is the confidence interval consistent with the test decision? Explain.