HW3: Uniform colors? (assigned on Thur Jan 15; due on Wed Jan 21)
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.

Does uniform color give athletes an advantage over their competitors? To investigate this question, Hill and Barton (Nature, 2005) examined the records in the 2004 Olympic Games for four combat sports: boxing, tae kwon do, Greco-Roman wrestling, and freestyle wrestling. Competitors in these sports were randomly assigned to wear either a red or a blue uniform. The researchers investigated whether competitors wearing one color won significantly more often than those wearing the other color. They analyzed results for a total of 457 matches.

a) Identify the observational units and variable in this study.

b) State the appropriate null and alternative hypotheses, both in symbols and in words.

c) Check whether the technical conditions for a one-proportion z-test are satisfied here.

The researchers found that the competitor wearing red defeated the competitor wearing blue in 248 matches, and the competitor wearing blue emerged as the winner in 209 matches.

d) Calculate the sample proportion of matches won by the competitor wearing red. Use the appropriate symbol to denote this.

e) Calculate the value of the z-test statistic by hand. Show the details of your calculation.

f) Calculate the p-value. Describe how you calculate this, and submit an appropriate graph with your calculation. (You can use either the normal table or Minitab or an applet.)

g) Describe how the z-statistic and p-value would be different (if at all) if you had worked with the sample proportion of matches won by the competitor wearing blue instead of red.

h) Based on your p-value, would you reject the null hypothesis at the .01 level? What about the .05 level? What about the .01 level?

i) Summarize your conclusion from this study.