STAT 301 HW3 due Thur Jan 13 or Fri Jan 14

You may work with one other person on this assignment, submitting one report with both names, provided that both of you contribute substantially to the work.

Competitive Advantage from Uniform Color?

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

b) Use the Binomial Distribution applet to simulate 1000 repetitions of these matches, under the null hypothesis. Submit a screen capture of the applet results.

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.

c) Use the applet simulation results to approximate the two-sided p-value from these data. Also report which values are being counted to determine this approximate p-value.

d) Use R or Minitab to determine the exact binomial (two-sided) p-value. Submit the output with your answer.

e) Summarize what your analysis reveals about how much evidence the data provide for concluding that uniform color does give one athlete an advantage over the other.

f) Use R or Minitab to determine a 95% confidence interval for the parameter. Also write a sentence interpreting what this interval says.

g) Now determine a 99% confidence interval for the parameter. Comment on how it differs from the 95% interval. [*Hint*: Refer to both the midpoints of the intervals and their widths.]

h) Are these confidence intervals consistent with your earlier test (parts a-e)? Explain briefly.