

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.

Baseball Big Bang?

A reader wrote in to the “Ask Marilyn” column in *Parade* magazine to say that his grandfather told him that in $\frac{3}{4}$ of all baseball games, the winning team scores more runs in one inning than the losing team scores in the entire game. (This phenomenon is known as a “big bang.”) Marilyn responded that this probability seemed to be too high to be believable. Let π denote the actual probability that a Major League Baseball game results in a “big bang.”

a) Restate the grandfather’s assertion as a null hypothesis, in symbols and in words.

b) Report Marilyn’s response as an alternative hypothesis, in symbols and in words.

To investigate this claim, I examined the 45 Major League baseball games played on September 17 – 19, 2010. I found that 21 of these 45 games contained a big bang.

c) Calculate the sample proportion of games that had a big bang, and denote it with the appropriate symbol.

d) If the grandfather’s claim is true, how many standard deviations below the mean is the observed sample proportion? Also denote this with the appropriate symbol.

e) Use the normal distribution to determine the approximate p-value, first without using the continuity correction and then with using the continuity correction. Also produce (and submit) an appropriately labeled shaded graph for each of these normal calculations.

f) Would you conclude that the sample data provide strong evidence to support Marilyn’s contention that the proportion cited by the grandfather is too high to be the actual value? Explain your reasoning, as if writing to the grandfather, who has never taken a statistics course.

g) Marilyn went on to assert that she believes the actual probability of a big bang to be .5. Conduct a two-sided test of this hypothesis. Report the hypotheses, test statistic and p-value. Again perform the calculations with and without using the continuity correction. Also calculate the exact p-value from the binomial distribution. Produce (and submit) appropriately labeled shaded graphs for all of these calculations. Comment on whether the continuity correction is helpful here. State the test decision at the $\alpha = .10$ significance level, and summarize your conclusion.