Introduction to Statistics
Activity 9.4d **NAME:**

Hypothesis Testing- Baseball "Big Bang"

A reader sent a letter to the "Ask Marilyn" column in *Parade* magazine to say that in three-quarters 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 proportion seemed too high to be believable. Let p be the proportion of all major-league baseball games in which a big bang occurs.

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

b) Given Marilyn's conjecture, state the alternative hypothesis, in symbols and in words.

To investigate this claim, we did a SRS to select one week of the 2006 major-league baseball season. Then we examined the 95 games played that week to determine which had a big bang and which did not.

c) Sketch and label the sampling distribution for the sample proportion of games containing a big bang, according to the Central Limit Theorem, assuming that the null hypothesis is true. Also check whether the conditions hold for the CLT to apply.

Of the 95 games in our sample, 47 contained a big bang.

d) Calculate the sample proportion of games in which a big bang occurred. Use an appropriate symbol to denote it.

e) Is this sample proportion less than three-fourths and therefore consistent with Marilyn's (alternative) hypothesis? Shade the area under your sampling distribution curve corresponding to this sample result in the direction conjectured by Marilyn.

f) Calculate the test statistic and find its *P*-value.

g) Generate your conclusion at the α = 0.01 level (all three parts).

In her response, Marilyn went on to conjecture that the actual proportion of big bang games is one-half.

h) Using a two-sided alternative, state the null and alternative hypotheses (in symbols and in words) for testing Marilyn's claim.

i) Calculate the test statistic, and use technology to determine the *P*-value for this test.

j) What conclusion would you draw concerning Marilyn's conjecture (all three parts)?