Math 263: Excel Assignment 7 on Hypothesis Tests: U of A Basketball at Home and Away

Due Thursday April 24, at the start of class. Hand in a paper print-out of your work.

You must do the computer work for this assignment yourself, although you may certainly talk to other people. Answers which appear to be copied will be treated as an integrity violation.

Note: You do not need to hand in your Excel sheet with the answers to your questions.

Overview

There is a popular belief in basketball that when a team plays a home game, they have a better chance of winning, or at least will play better than they would have done on the road. To test the belief that there is a "Home Court Advantage", we will analyze the UA team's scores.

The file *UA-BballResults13.xlsx* has all the UA conference basketball scores from 2001-2013. Until 2012, there were 10 teams in the Pac-10 conference; Utah and Colorado were then added to make the Pac-12. In most games between teams in this conference, one team is at home; the opposing team is then away. A few games are played in a neutral location, when neither team is at home.

Sorting the Data

Before making the comparisons, you should sort the data into three groups, one with all the home games, one with all the away games, and a third with the games played in neutral locations. (We will ignore the games in Neutral locations.) One way of doing this is to:

- Copy all the information on a new sheet
- Erase the dates (2001, 2002, etc)
- Sort the data based on the home/away (column D), so all the away games are on top and the home games are on the bottom.
- Cut and paste the home games to another part of the spreadsheet.

Another way is to select the top row and input "Filter" tabs from the "Data" menu. By pulling down the tabs, filter the Away games and the Home games and Neutral games and then copy and paste to another sheet. (The "Filter" tabs are often very useful and take only a minute to insert!) There should be the same the same number of games in each group, "Home" and "Away".

Calculating Wins and Losses

For the Home and Away games, make two new columns:

- One column showing the difference in scores for each game:
$$\text{Difference} = \text{Arizona} - \text{Opponent}.$$
- The other column showing if Arizona won. Here you can use the "IF" command. You want to test that the difference in scores is positive, so you can use
$$= \text{IF}(\text{Difference} > 0, 1, 0).$$
This puts a 1 in the row if Arizona won and a 0 if Arizona lost or tied. "Difference" refers to the cell where the difference for that match is stored.

Calculating *P*-values

For the Normal Distribution: A one sided test:
$= \text{NORMDIST}(z, 0, 1, \text{TRUE})$ if z is negative, or
$= 1 - \text{NORMDIST}(z, 0, 1, \text{TRUE})$ if z is positive.

For the T-Distribution: The t-value must be positive, so use ABS(t).
One sided test: $= \text{TDIST}(\text{ABS}(t), df, 1)$ or
Two sided test $= \text{TDIST}(\text{ABS}(t), df, 2)$

Questions:

1. **Decide if UA wins more often at home.** To do this, test whether the proportion of UA wins at home is significantly greater than the proportion of UA wins away. Write out your reasoning in detail, showing
   - the null and alternate hypotheses,
   - the calculation of the standard error,
   - the calculation of the test statistic,
   - the p-value,
   - the interpretation of the p-value,
   - your conclusion and its interpretation in terms of UA basketball.

2. **Decide if the margin of victory is greater at home or away over all games**. To do this, you will look at the margin of victory, or difference in scores, for all games (including those that UA won and those that UA lost). Some of the margins will be negative, where UA lost the same. Test whether UA's margin of victory at home is significantly greater than UA's margin of victory away. Write out your reasoning in detail, showing
   - the null and alternate hypotheses,
   - the calculation of the test statistic,
   - the p-value,
   - the interpretation of the p-value
   - your conclusion and its interpretation in terms of UA basketball.

3. ***OPTIONAL.*** *(Not for extra points; just if you are interested.)* **Decide if the margin of victory is greater at home or away using only the games in which UA won**. To do this, you will look at the margin of victory, or difference in scores, for only the games that UA won. Test whether UA's margin of victory at home is significantly greater than UA's margin of victory away. Write out your reasoning in detail, showing
   - the null and alternate hypotheses,
   - the calculation of the test statistic,
   - the p-value,
   - the interpretation of the p-value
   - your conclusion and its interpretation in terms of UA basketball