Homework №7

Math 107, Spring 2016 Due: April 29 by 4:00 pm

Problem 1

In September 2010, *Psychological Science* published the article "Power Posing: Brief Nonverbal Displays Affest Neuroendorcrine Levels and Risk Tolerance", descrbing an experiment involving 42 participants, where 20 participants were randomly assigned to hold low-power poses (contractive positions, closed limbs) and 22 participants were randomly assigned to hold high-power poses (expansive positions, open limbs) for two minutes. All participants were told that the aim of this exercise was to see if their heart rate changed. After the exercise, each participant was given $2 and told that they could keep the money or roll a die for a "double or nothing." The resulting data are shown below

Bet/Pose	High power	Low power	Total
No	4	17	21
Yes	18	3	21
Total	22	20	42

The researchers were investigating whether people who hold "high-power poses" are more likely to take risks (such as the double or nothing bet) compared to those who hold "low-power poses." The data set `poses.csv` contains the data table created by the researchers.

(a) Using correct mathematical notation, write down the hypotheses for a permutation test to determine whether people who hold "high-power poses" are more likely to take risks than those who hold "low-power poses."

(b) Calculate the proportion of the 22 participants who were assigned to "high-power" poses that took the bet, the proportion of the 20 participants who were assigned to "low-power" poses that took the bet, and the difference of proportions.

(c) Use R to create a permutation distribution consisting of 1000 simulations. Create a histogram of the permutation distribution with a superimposed vertical line representing the observed difference in proportions. Include this plot in your homework submission along with the R code you used to generate it.

(d) Describe the shape of the randomization distribution you created in the previous part.

(e) Use R to calculate a the p-value from your permutation distribution. Include the code you used to perform your calculation and report the p-value that you obtained.

(f) Based on your p-value, does it appear that there is evidence that people who hold "high-power poses" are more likely to take risks than those who hold "low-power poses."

Problem 2

A 2012 survey of 2,254 American adults indicates that 17% of cell phone owners do their browsing on their phone rather than a computer or other device.[1]

(a) According to an online article, a report from a mobile research company indicates that 38 percent of Chinese mobile web users only access the internet through their cell phones.[2] Using correct mathematical notation, write down the hypotheses for a permutation test to determine if these data

[1] Pew Internet, Cell Internet Use 2012, data collected between March 15 - April 13, 2012.

[2] S. Chang. "The Chinese Love to Use Feature Phone to Access the Internet". In: *M.I.C Gadget* (2012).

provide strong evidence that the proportion of Americans who only use their cell phones to access the internet is different than the Chinese proportion.

(b) Use R to create a permutation distribution consisting of 1000 simulations. Create a histogram of the permutation distribution with a superimposed vertical line representing the observed proportion. Include this plot in your homework submission along with the R code you used to generate it. (Hint: You will need to use the `prob` argument in the `rflip` function. Type `?rflip` for help in R.)

(c) Describe the shape of the randomization distribution you created in the previous part.

(d) Use R to calculate a the p-value from your permutation distribution. Include the code you used to perform your calculation and report the p-value that you obtained.

(e) Based on your p-value, does it appear that the proportion of Americans who only use their cell phones to access the internet is different than the Chinese proportion?