**Homework 05.**

In this assignment you will have a chance to apply statistics to a real-world data set.

**Assigned: 26 September 2017**

**Due: 5:00PM PST, 3 October 2017**

**Instructions: There are ten multiple choice questions. To receive credit, EMAIL your solution by the deadline to** [**tony\_statman@yahoo.com**](mailto:tony_statman@yahoo.com) **according to the following instructions:**

* The SUBJECT LINE must be “**GSBA545 HW05 for [Last name, First name] –** “ and then the ten letters corresponding to your answers; so, for example, if your name were John Doe, and you believed the answers were ABCCDCABED, then the subject line of the email must be “**GSBA545 HW05** for **Doe, John - CABEDABCCD**”
  + The first six characters (**GSBA545**) do not have a space between “GSBA” and “545”
  + The ten characters of your answer should have **no spaces in between**
  + If you submit less than 10 letters, it is assumed that the first letter corresponds to your answer to the first question, etc.
* The FIRST LINE of the body of the email should be your last name, your first name, and your student ID
* The SECOND LINE of the body of the email should be five letters, corresponding to the answers to the five questions (make sure your answer consists of five characters)

**For example, a typical email might be**

From: John Doe <john.doe@usc.edu>

To: tony\_statman <tony\_statman@yahoo.com>

Subject: GSBA545 HW05 for Doe, John - ACEDBADBED

DOE, JOHN 123456789  
ACEDBADBED

In a recent study (see <http://abcnews.go.com/Health/wireStory/study-prompts-call-examine-flu-vaccine-miscarriage-49813933> ), doctors examined 485 women who had a miscarriage between 2010 and 2012. The doctors then “matched” each woman who had a miscarriage with another woman who did not have a miscarriage and who had the same age and had the same date of last menstrual period. The doctors noticed that, among the 485 women who had had a miscarriage, 17 had had back-to-back flu shots for the 2010-2011 flu season and for the 2011-2012 flu season. Among the 485 “matched” women who had not had a miscarriage, only 4 had had back-to-back to flu shots.

1. The doctors wanted to know if women who had miscarriages were more likely to have had back-to-back flu shots than women who had not had back-to-back flu shots. What would the null hypothesis be?
2. The rate of back-to-back flu shots in the sample of 485 women who had miscarriages was equal to the rate of back-to-back flu shots in the sample of 485 women who had not miscarriages.
3. The rate of back-to-back flu shots is the same in the population of all women who had had miscarriages and the population of all women who had not had miscarriages.
4. The rate of miscarriages is the same in the population of all women who had had back-to-back flu shots as it was for the population of all women who had not had back-to-back flu shots.
5. The rate of miscarriages is the same in the sample of 485 women who had had back-to-back flu shots as it was for the sample of 485 women who had not had back-to-back flu shots.
6. Both B and C are correct.
7. When testing the null hypothesis, what is the appropriate p-value?
8. Less than 0.001
9. Between 0.001 and 0.005
10. Between 0.005 and 0.010
11. Between 0.010 and 0.050
12. Greater than 0.050
13. What is the appropriate conclusion?
14. Reject H0, and conclude that back-to-back flu shots increase the risk of miscarriage
15. Reject H0, and conclude that woman who had miscarriages are more likely to have had back-to-back flu shots
16. Fail to reject H0, and conclude there may or may not be a relationship between back-to-back flu shots and miscarriages
17. Accept H0, and conclude we have “statistically significant proof” that there definitely is no relationship between back-to-back flu shots and miscarriages
18. Reject H0, and conclude that the sample proportions are not equal.
19. What is a 95% confidence interval for the absolute difference in rates

(pback-to-back – pnot back-to-back), expressed as a number of percentage points?

1. 0.9% to 4.5%
2. 14.5% to 48.7%
3. 1.46% to 13.08%
4. –2.6% to 2.6%
5. –4.5% to –0.86%
6. What is a 95% confidence interval for the odds ratio for the odds that a woman had back-to-back flu shots, when comparing women who had had a miscarriage with women who had not had a miscarriage?
7. 0.9 to 4.5
8. 1.5 to 13.1
9. 0.8 to 3.5
10. 0.0 to 18.5
11. 0.0 to 1.0
12. A researcher wants to use these data to estimate the chance that back-to-back flu shots cause a miscarriage. If it makes sense to do so, construct a 95% confidence interval for the difference in miscarriage rates, expressed as a number of percentage points; if it does not make sense to do so, explain why not.
13. A confidence interval can not be constructed, because the 485 women who had miscarriages are not a simple random sample of women who received back-to-back flu shots.
14. It makes sense to construct a confidence interval, and the confidence interval is 0.86% to 4.50%
15. It makes sense to construct a confidence interval, and the confidence interval is 14.5T to 48.7%
16. A confidence interval can not be constructed here because each women either does or does not have a miscarriage.
17. It makes sense to construct a confidence interval, and the confidence interval is 1.03% to 18.46%

In June 2017, the Pew Research center asked the equivalent of a simple random sample of 1741 U.S. adults, “do colleges and universities have a positive effect on the way things are going in the country?” The sample included 948 Democrats, and 71.5% of them said yes; the rest of the sample were Republicans, and 35.6% of them said yes.

1. What is a 95% confidence interval for the percentage of all U.S. adults who think that colleges and universities have a positive effect on the way things are going in the country?
2. 51.2% to 55.9%
3. 52.8% to 57.5%
4. 49.6% to 54.3%
5. 50.2% to 56.9%
6. 42.5% to 47.2%
7. A researcher is interested in testing the hypothesis that Democrats and Republicans have the same view about colleges and universities. What is the appropriate p-value?
8. Less than 0.001
9. Between 0.001 and 0.010
10. Between 0.010 and 0.050
11. Greater than 0.050
12. p-value can not be determined, since the population rates are unknown
13. What is a 95% confidence interval for the percentage of U.S. adults who are Republicans?
14. 32.2% to 39.0%
15. 43.2% to 47.8%
16. 52.1% to 56.8%
17. 52.8% to 57.5%
18. 68.5% to 74.4%
19. Suppose a researcher is interested in interviewing Republicans who feel that colleges and universities have a positive effect. Suppose it is believed that 16% of U.S. adults fall in this category. How large a sample of U.S. adults would be needed to ensure that there is a 95% chance of getting 500 or more such people in the sample?
20. 3289
21. 3339
22. 3376
23. 3509
24. 3455