# Home Work # 3. AMS 380

# Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_SBU ID:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Dear all, the homework is due on Tuesday, February 23, 2021, at 9:45am. Quiz 1 will be given on Thursday, February 25, 2021, in class, covering the same topics as HW 3. Please submit your homework to the Blackboard in a word document – the handwritten parts should be imported to the word doc as figures.

# Please include (1) R code; (2) Output from R; (3) Answers to all the questions asked.

1. Dr. Oz has a crazy hypothesis. He hypothesized that the average weight of adult US men and US women are equal. A group of smart Stony Brook University students do not agree with this hypothesis, and they got the SBU IRB (<https://www.stonybrook.edu/commcms/research-compliance/>) approval to draw two independent random samples of 9 adult men and 9 adult women. The measured weight (in kg) is as the following:

ID group weight

1 Woman 38.9

2 Woman 61.2

3 Woman 73.3

4 Woman 21.8

5 Woman 63.4

6 Woman 64.6

7 Woman 48.4

8 Woman 48.8

9 Woman 48.5

10 Man 67.8

11 Man 60.0

12 Man 63.4

13 Man 76.0

14 Man 89.4

15 Man 73.3

16 Man 67.3

17 Man 61.3

18 Man 62.4

Please answer the following questions – and follow the following website for the R procedures:

<http://www.sthda.com/english/wiki/unpaired-two-samples-t-test-in-r>

(a). Please visualize the two groups using the Box plot in R.

(b). Please test the normality and equal variance assumptions using R.

(c). Please perform the correct test comparing whether the two means are equal or not using R. Please report the p-value of your test. Please also construct the 95% confidence interval for the mean difference using R.

(d). Please perform the correct test comparing whether the two means are equal or not by hand. Please make decision for your hypothesis test at the significance level of Please also construct the 95% confidence interval for the mean difference by hand.

1. While most of the time we wish to reduce our weight, there are times when we wish to gain some weight. The MiraGro Co. has developed just such a weight gain formula and they tested it on 10 mice. The weight of the mice before and after the treatments are as follows (in unknown unit):

ID group weight

1 before 200.1

2 before 190.9

3 before 192.7

4 before 213.0

5 before 241.4

6 before 196.9

7 before 172.2

8 before 185.5

9 before 205.2

10 before 193.7

1 after 392.9

2 after 393.2

3 after 345.1

4 after 393.0

5 after 434.0

6 after 427.9

7 after 422.0

8 after 383.9

9 after 392.3

10 after 352.2

Please answer the following questions – and follow the following website for the R procedures:

<http://www.sthda.com/english/wiki/paired-samples-t-test-in-r>

(a). Please visualize the two groups using the Box plot and the Profile plot in R.

(b). Please test the normality assumption using R.

(c). Please perform the correct test examining whether the mean difference is zero or not using R. Please report the p-value of your test. Please also construct the 95% confidence interval for the mean difference using R.

(d). Please perform the correct test examining whether the mean difference is zero or not by hand. Please make decision for your hypothesis test at the significance level of *.* Please also construct the 95% confidence interval for the mean difference by hand.

1. A true story goes as follows. Many years ago, when we were still using the typewriter to record data and write research report, a group of lung cancer researchers hired a wonderful typist to enter the lung cancer patient data. The lady was a heavy smoker. In the midst of entering the patient data; however, she quit smoking once and for all. The following is a data set of smokers among lung cancer patients and healthy individuals. I personally found the data to be very unrealistic, however; it is only an example, and most likely a fake example.

Group A: lung cancer patients: n = 500, 490 smokers;

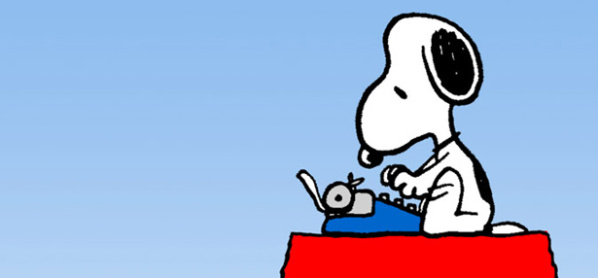
Group B: healthy individuals: n = 500, 400 smokers.

Please answer the following questions – and follow the following website for the R procedures:

<http://www.sthda.com/english/wiki/two-proportions-z-test-in-r>

(a). Please perform the correct test examining whether the proportion of smokers are equal between Group A and Group B, using R. Please report the p-value of your test. Please also construct the 95% confidence interval for the mean difference in proportions using R.

(b). Please perform the correct test examining whether the proportion of smokers are equal between Group A and Group B, by hand. Please make decision for your hypothesis test at the significance level of *.* Please also construct the 95% confidence interval for the mean difference in proportions by hand.



<https://www.peanuts.com>