

Assignment 6. Hypothesis Testing for Means: Due Thursday, November 8 at 3PM

Use hypothesis testing to answer the questions below. *For each problem (including the ones using Stata!), make sure to state your null and research hypotheses in words as well as using formal notation. After finishing the test, state your formal conclusion with regard to the null hypothesis as well as your substantive answer to the question. After that, evaluate the probability that you could be making Type I and Type II error.*

(For the problems where you do calculations by hand, I would recommend also clearly writing down your intermediate steps; that way, you can still receive partial credit even if something goes wrong in one of the steps.)

1. A new drug has been developed, and preliminary evidence indicates that it may reduce people’s migraine pain. A study aims to assess the effectiveness of a new drug against migraines. The 30 patients with this condition who volunteered for this study are randomly assigned to one of two groups: The first group will take the new drug for three months, while the second group will take a placebo for the same time period. The following table presents the average levels of migraine pain that each of these patients reported over this time period. Using 95% confidence level, can we conclude that the new drug is more effective than placebo? After the assessment, evaluate the probability that you may be making Type I and Type II error.

Patient ID#	Migraine score for those taking the drug	Patient ID#	Migraine score for those taking placebo
1	5	16	7
2	4	17	8
3	6	18	6
4	8	19	2
5	4	20	8
6	3	21	5
7	5	22	7
8	2	23	6
9	6	24	7
10	5	25	5
11	3	26	4
12	7	27	8
13	4	28	5
14	4	29	7
15	3	30	4

2. A study aims to determine whether sisters and brothers in U.S. families with two mixed-gender children provide different amount of hands-on care to their frail or disabled parents. 12 pairs of siblings from randomly selected families with frail/disabled elderly parents participate in the study; the data are in the table below. Using 90% confidence level, evaluate whether we can conclude that sisters and brothers differ in the number of hours of care they provide. After the assessment, evaluate the probability that you may be making Type I and Type II error.

Family #	Brother's hours	Sister's hours
1	5	18
2	12	10
3	6	21
4	17	19
5	5	7
6	0	16
7	14	13
8	16	16
9	7	18
10	9	16
11	11	13
12	10	12

3. A study aims to assess whether taking a statistics course improves students math skills. 40 students take the test prior to attending a statistics course as well as after the semester is over; the average difference in their math score is 0.5 (SD=1). Using 95% confidence level, can we conclude that taking this statistics course helps improve students' math skills? After the assessment, evaluate the probability that you may be making Type I and Type II error.

4. Using variables *educ* and *speduc* in GSS2012 data, test whether in the U.S., people's levels of education are different from their spouses' levels of education. Use 95% confidence level for this assessment. After the assessment, evaluate the probability that you may be making Type I and Type II error (use p-value in your evaluation).

5. Test whether American women and men differ from each other in their TV watching habits using variables *tvhours* and *sex* from GSS2012 data. Use 90% confidence level for this assessment. After the assessment, evaluate the probability that you may be making Type I and Type II error.

Please make sure to print out the log file with your Stata output and submit it with your assignment.