

SM-1402: Exercise 6 (Comparing groups)

1. The data shows the effect of two soporific drugs measured by the increase in hours of sleep (compared to control) for 10 patients.

ID	Control	Treatment
1	0.7	1.9
2	-1.6	0.8
3	-0.2	1.1
4	-1.2	0.1
5	-0.1	-0.1
6	3.4	4.4
7	3.7	5.5
8	0.8	1.6
9	0.0	4.6
10	2.0	3.4

Calculate a 95% confidence interval for the mean difference in the number of hours of sleep before and after taking the drugs. Is there a significant difference between the number of hours of sleep in the two groups?

2. In 1861, 10 essays appeared in the New Orleans Daily Crescent. They were signed “Quintus Curtius Snodgrass”; though some people suspected they were actually written by Mark Twain. To investigate this, we will consider the proportion of three letter words found in an author’s work. From 8 of Twain’s essays, the proportions are:

0.225 0.262 0.217 0.240 0.230 0.229 0.235 0.217

From 10 Snodgrass’ essays, the proportions are:

0.209 0.205 0.196 0.210 0.202 0.207 0.224 0.223 0.220 0.201

- (a) Calculate the sample means \bar{x} and sample standard deviations s for Twain’s and Snodgrass’ proportions of three letter words.
 - (b) Test the hypothesis that the mean difference between the proportions of three letter words from the two authors’ essays is zero.
 - (c) What assumptions have you made in your calculations?
3. Consider a random variable X distributed according to $F_{6,20}$, and another random variable Y distributed according to $F_{20,6}$.
 - (a) What value of x satisfies $\Pr(X > x) = 1\%$?
 - (b) What value of y satisfies $\Pr(Y < y) = 1\%$?

4. A random sample of house prices (in thousands of dollars) in the four districts of Brunei were obtained for a identical houses in terms of type, size and land area. The data are as follows.

i	Brunei-Muara	Belait	Tutong	Temburong
1	315	335	269	297
2	324	318	257	266
3	335	304	263	311
4	312	331	304	300
5	300	304	289	
6	313	293	260	
7	314			
8	290			

Is there a statistically significant difference in house prices in the four districts?