

SMD Homework Exercises 3.

1. R.A. Fisher investigated the effect of two seducers on 10 patients. The surplus sleep, A and B pills cause (in hours) are below:

No.	A	B	B-A
1.	+0.7	+1.9	+1.2
2.	-1.6	+0.8	+2.4
3.	-0.2	+1.1	+1.3
4.	-1.2	+0.1	+1.3
5.	-0.1	-0.1	0.0
6.	+3.4	+4.4	+1.0
7.	+3.7	+5.5	+1.8
8.	+0.8	+1.6	+0.8
9.	0.0	+4.6	+4.6
10.	+2.0	+3.4	+1.4

Is the difference between the effect of the two seducers significant? If yes, then is seducer B significantly better than A? Decide with different levels of significance! Be careful, which kind of t-test you use!

2. 10-10 nails are manufactured on two machines. The average sizes (cm) and corrected empirical standard deviations are:

$$\bar{x} = 0.625, \quad \bar{y} = 0.471, \quad s_x^* = 0.754, \quad s_y^* = 1.269.$$

Compare the variances of the production of the two machines with F-test, and investigate the null-hypothesis that there is no difference in the sizes of the production of the two machines! Use $\alpha = 0.10$ for the level of significance! Be careful, which kind of t-test you use!

How would you test the same hypothesis if 100-100 nails are manufactured on two machines with the same empirical data?

3. Is the chance of hypertony is the same in normal and overweighted population? Decide using the following evidences with $\alpha = 0.01$. Out of 4200 normal patients 792, while out of 1000 overweighted ones 249 suffered of hypertony.

Next test, whether the overweight increases the chance of hypertony.

4. We asked 460 persons whether they like coffee (yes/no) or tea (yes/no). 416 like both, 5 like none of them, 16 like coffee but do not like tea, and 23 like tea but do not like coffee. Decide whether the attitudes toward coffee and tea are independent with level of significance $\alpha = 0.05$.
5. The number of boys in 500 families with 5 children is investigated. There were 20 families with no boy, 75 with 1, 145 with 2, 140 with 3, 85 with 4, and 35 with 5 boys. Decide (with level of significance $\alpha = 0.05$) whether the number of boys in a 5-children family follows binomial distribution.