

1. Your laboratory is looking wants to check if a particular mutation of the H5N1 avian flue increases the virus virulence *in vitro*. In this study design, human cell cultures are infected by the wild-type virus or by the mutated virus and the proportion of dead and living cells is measured for a cm² after 24h. The results look like this:

	Nr. dead cells	Nr. living cells
H5N1 wildtype	40	100
H5N1 mutated	10	70

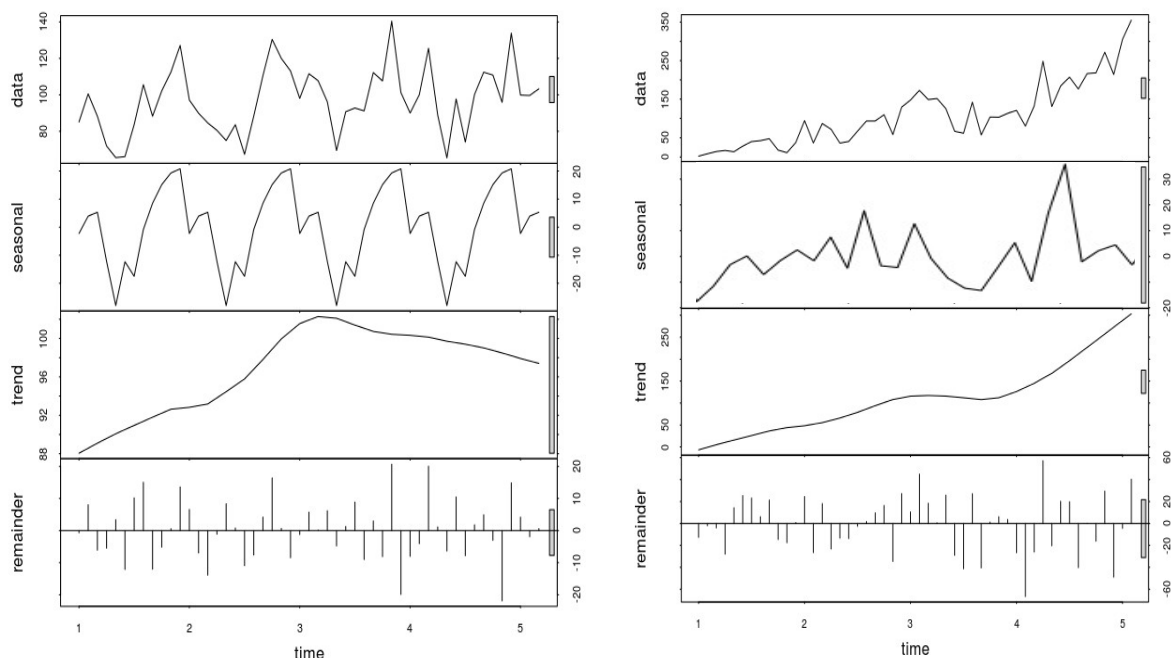
The best statistical test for the analysis is:

- a) ANOVA
- b) Fisher's Exact Test
- c) Conditional Logistic Regression
- d) Mann-Whitney U-test

2. In a clinical trial in the U.S.A. a new drug against herpes simplex is being compared to the standard medication. The herpes patients belong to different ethnic, age, geographic, socioeconomic and gender groups, and they fill a questionnaire about that points at the beginning of the study. Although the mentioned factors may play a role, we are only interested in differences in the efficacy of the drug (outcome: cured/not cured). The best statistical analysis would be:

- a) ANOVA
- b) Fisher's Exact Test
- c) Conditional Logistic Regression
- d) Unconditional Logistic Regression

3. We analyze the effect of a cholinesterase-inhibitor among Alzheimer Disease (AD) patients for 4 months. The first graphic corresponds to the drug group, the second graphic corresponds to the placebo group. (x-axis=time, y-axis=AD impairment)



In comparison with placebo, we could say that the drug:

- a) introduces only a cyclic element
- b) introduces only a progressive element
- c) introduces a progressive (negative) and cyclic element
- d) neither a progressive nor a cyclic element

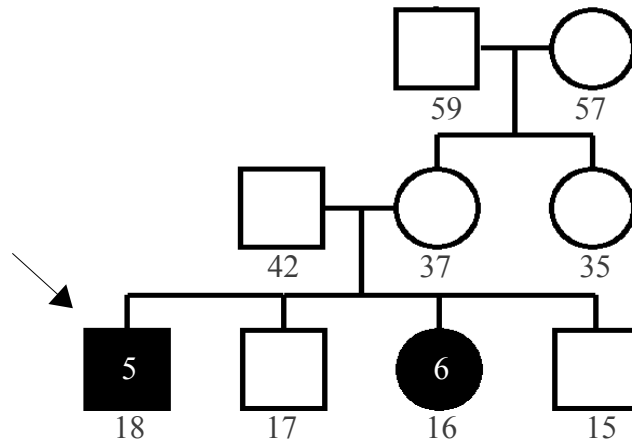
4. In the former example a trend test is performed for the placebo group. The results (R) show:

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trend.test(alz3)
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Spearman's rank correlation rho
S = 2500, p-value < 2.2e-16
alternative hypothesis: true rho is not equal to 0
sample estimates: rho 0.879952
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- a) there is a statistically significant trend
- b) there is no statistically significant trend
- c) there is a statistically significant cycle
- d) there is no statistically significant cycle

5. There is some evidence that first degree relatives (**siblings, parents or children**) of patients of diabetes type 2 have a higher chance to develop themselves diabetes type 2. You want to perform a survival analysis for these relatives and first you need a vector with the censoring age. Age is written below the symbol, age of diagnosis is written inside the symbol. Please select the correct vector for the following family (remember, the proband is not included, it just affects the relatives in first degree). Attention: the vectors are simplified in 5 years intervals!



a)

0-4	5
5-9	5
10-14	4
15-19	4
20-24	2
25-29	2
30-34	2
35-39	2
40-44	1
45-49	0
50-54	0
55-59	0
60-64	0
65-69	0
70-74	0

b)

0-4	5
5-9	5
10-14	5
15-19	5
20-24	2
25-29	2
30-34	2
35-39	2
40-44	1
45-49	0
50-54	0
55-59	0
60-64	0
65-69	0
70-74	0

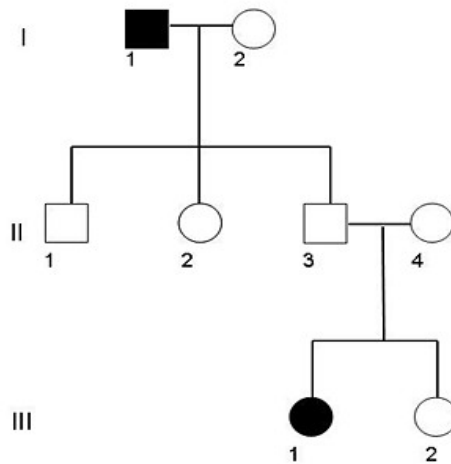
c)

0-4	6
5-9	6
10-14	6
15-19	6
20-24	2
25-29	2
30-34	2
35-39	2
40-44	1
45-49	0
50-54	0
55-59	0
60-64	0
65-69	0
70-74	0

d)

0-4	9
5-9	9
10-14	9
15-19	9
20-24	5
25-29	5
30-34	5
35-39	5
40-44	3
45-49	2
50-54	2
55-59	2
60-64	0
65-69	0
70-74	0

6. The following pedigree shows a family with two patients of a somatic recessive inherited disease. All carriers are healthy. The disease can be detected since birth.



Individual III.2 wants to know if she is a carrier of the disease allele. She undergoes a genetic testing for 100% of all possible mutations that lead to the disease. The test has a specificity of 98% and a sensitivity of 80%. The result of the test is positive. Which is the Bayes posterior probability of being a carrier, knowing this information?

a)

	Carrier	Non-carrier
Prior	1/2	1/4
Cond +	0.8	0.02
Joined	0.4	0.005
Post.	0.988	0.002

98.8%

b)

	Carrier	Non-carrier
Prior	1/3	2/3
Cond +	0.8	0.02
Joined	0.266	0.0133
Post.	0.952	0.048

95.2%

c)

	Carrier	Non-carrier
Prior	2/3	1/3
Cond +	0.8	0.02
Joined	0.533	0.0067
Post.	0.988	0.002

98.8%

d)

	Carrier	Non-carrier
Prior	2/3	1/3
Cond +	0.98	0.2
Joined	0.6533	0.067
Post.	0.907	0.093

90.7%

1b,2c,3c,4a,5a,6c