Tests of Symmetry

Exercise 6.1

Average salaries [€] in selected European Union countries are:

3880, 3222, 2951, 2935, 2873, 2801, 2799, 2412, 2346, 1775, 1710, 1617, 1381, 1344, 1253, 678.

At the significance level $\alpha = 0.05$, use the sign test to test H_0: population median = 2300 against H_1: population median $\neq$ 2300.

Exercise 6.2

Systolic blood pressure [mmHg] was measured in eight people before and after an experiment. The measurements are paired by person.

Person	1	2	3	4	5	6	7	8
Before	130	185	162	136	147	181	138	139
After	139	190	175	135	155	175	158	149

At $\alpha = 0.05$, use the sign test to determine whether an increase in systolic blood pressure during the experiment is as likely as a decrease.

Exercise 6.3

Ten people followed a special diet. Their weights [kg] before the diet and after three weeks are shown below. The measurements are paired by person.

Person	1	2	3	4	5	6	7	8	9	10
Before	68	80	92	81	70	79	78	66	57	76
After	60	84	87	79	74	71	72	67	57	60

At $\alpha = 0.05$, use the sign test to determine whether the diet affected the participants' weight.

Tests of Symmetry

Exercise 6.4

Applicants took an IQ test. The scores in the comparison groups of boys (x) and girls (y) are:

Boys: 113, 115, 109, 100, 107, 97, 118, 135, 125.
Girls: 107, 131, 128, 118, 111, 114, 112, 102.

At $\alpha = 0.05$, use the two-sample Wilcoxon test to determine whether the groups differ significantly in their IQ test scores.

Exercise 6.5

The effects of two catalysts on gas conversion were investigated. The observed conversion percentages were:

Catalyst 1: 24.1, 22.8, 24.4, 24.7, 23.9.
Catalyst 2: 23.2, 24.5, 24.1, 25.1, 22.6, 24.2, 24.0.

At $\alpha = 0.05$, use the two-sample Wilcoxon test to determine whether the catalysts differ significantly in their effects on gas conversion.

Exercise 6.6

Two samples of casting dimensions [mm] were measured:

Sample 1: 3.7, 3.6, 4.0, 3.8, 4.0, 3.2, 3.7, 4.0, 3.5, 4.1.
Sample 2: 3.9, 4.6, 3.9, 4.9, 4.7, 3.7, 4.8, 5.5.

At $\alpha = 0.05$, use the two-sample Wilcoxon test to determine whether the casting dimensions differ significantly between the two samples.

Exercise 6.7

Using the data from Exercise 5.7, determine whether the quality of two deliveries differs significantly. Use the two-sample Wilcoxon test at $\alpha = 0.05$. The data are reproduced here: the number of switching cycles fluorescent lamps withstood without damage.

Supplier 1: 2139, 2041, 1968, 1903, 1952, 1980, 2089, 1915, 2389, 2163, 2072, 1712, 2018, 1792, 1849.
Supplier 2: 1947, 1602, 1906, 2031, 2072, 1812, 1942, 2074, 2132.