# Additional Exercises

Two-Sample Parametric Tests | Exercises 5.7–5.9

## Instructions for students

First decide whether the samples are independent or paired. For independent samples, justify the choice of a pooled or Welch t-test. For a paired test, calculate the differences $d_i$ and analyse them as one sample.

## Common assumption

Assume normal distributions. Samples in Exercises 5.7 and 5.8 are independent. Data in Exercise 5.9 are paired: each person has two measurements.

## PROBLEM STATEMENTS

### Exercise 5.7

A customer receives fluorescent lamps from two suppliers. The number of switching cycles each lamp withstands without damage is recorded.

**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.

At $\alpha = 0.05$, test whether there is a statistically significant difference between the mean quality of the two suppliers' lamps.

### Exercise 5.8

In an anthropological study, nose width [cm] was measured in men aged 21–50 years.

**North:** 3.6; 4.1; 3.3; 3.4; 3.7; 3.1; 4.0; 4.0; 3.6; 3.0; 3.3; 3.7; 4.3; 3.3; 3.4; 3.4; 3.3; 3.6; 4.0; 3.4; 3.7.

**South:** 4.1; 3.9; 4.0; 3.8; 4.1; 4.2; 3.8; 3.9; 3.8; 3.8; 4.0; 3.7; 3.9; 4.4; 3.7; 3.8; 3.9; 3.9; 4.0; 4.1; 3.8; 4.0; 4.3.

At $\alpha = 0.05$, assess whether the difference between the population means is statistically significant.

## Exercise 5.9

A weight-loss treatment was tested on a group of volunteers. Their weights [kg] before and after the treatment were:

**Before:** 85, 75, 90, 65, 150, 80, 110, 56, 88, 73, 67, 134.
**After:** 76, 75, 81, 64, 155, 72, 99, 45, 89, 66, 56, 110.

At $\alpha = 0.05$, perform a paired test of the means with a two-sided alternative.