Hypothesis test about a population variance – test zhody rozptylu so známou konštantou

$$\chi^2 = \frac{(n-1)\cdot s_1^2}{\sigma_0^2}$$ we use a χ^2 (Chi-square; read as „kai“) distribution

σ_0^2 denotes the specific numerical value (a constant) being considered in the null and alternate hypotheses.

Solution to hypothesis testing:

- *if the test statistic lies the interval comprised of the lower and upper limit (two critical values), then the null hypothesis cannot be rejected*
- *if the test statistic is greater than the upper limit or smaller than the lower limit of the interval, then the null hypothesis is rejected and the alternate hypothesis is accepted*

Hypothesis test about the variances of two populations – test zhody dvoch rozptylov

$$F = \frac{s_{11}^2}{s_{12}^2}$$ we use a Fisher (F) distribution

Note: it is always specified as one-tailed test and so the numerator of the ratio (s_{11}^2) should be greater than the denominator of the ration (s_{12}^2), i.e. denote the population providing largest sample variance as population 1.

Note: if the data set is present, i.e. you do not have only the sample statistics, you can compute the F-test: Two Sample for variances using Tools/Data Analysis (variable 1 and 2 range should be the same as population 1 and 2 according to the values of sample variances, see above).

After we find a conclusion to this test and at least one of the sample sizes is smaller than 30, we have to continue in hypothesis testing, as follows:

- if the null hypothesis cannot be rejected, i.e. the **variances of two populations are equal**, than we compute the *t-test: Two-sample assuming equal variances*

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1-1)s_{11}^2 + (n_2-1)s_{12}^2}{n_1+n_2-2}}} \cdot \sqrt{\frac{n_1.n_2}{n_1+n_2}}$$

- if the null hypothesis is rejected, i.e. the **variances of two populations are not equal**, than we compute the *t-test: Two-sample assuming unequal variances* (Behrens-Fisher test)
