

Chapter 9

- 9-1. Medians are 12.25 for group 1, 7.75 for group 2 and 5.80 for group 3; average ranks are 36.5 for group 1, 23.3 for group 2 and 16.9 for group 3; the Kruskal-Wallis test is appropriate to use; the test statistics  $H = 15.3$ ,  $df = 2$  and  $p = 0.001$ , indicating the medians are significantly different.
- 9-2.  $R_{WRS} = 130.5$ ,  $p = 0.535$  for a two-sided test, no evidence to reject the null hypothesis.
- 9-3. An one-sided test would be appropriate, expecting that the relaxation method with biofeedback would be more effective than the relaxation only method. However, the data clearly indicate that the relaxation method with biofeedback turned out to be less effective and there is no need for a statistical test. For a two-sided test,  $R_{WRS} = 543.5$  and  $p = 0.0003$ ; we reject the null hypothesis and conclude that the relaxation method with biofeedback is significantly less effective than the relaxation only method.
- 9-4. Divide into three groups based on the toilet rate (1 to 61), (133 to 276) and (385 to 749), with 9 observations in group 1, 6 in group 2 and 6 in group 3; since  $H = 6.67$  with  $p = 0.036$ , we reject  $H_0$ .
- 9-6. Of the 24 patients, 17 showed decreases, 1 had no change and 6 showed increases; the sign test shows a statistically significant result with  $p = 0.0173$ ; this result needs to be interpreted, taking into account the statistically significant trend of reversion to the mean, with  $p = 0.0466$  using the sign test.
- 9-7. The results by the Wilcoxon signed rank test are consistent with that obtained by the sign test in Exercise 9-6, although the p-value is slightly smaller with the Wilcoxon signed rank test than with the sign test.