<u>Summary</u>

- Nonparametric tests do not make assumptions that the population is from a specific distribution. Therefore its results are more robust than a parametric test when such assumptions are violated.
- The Wilcoxon signed-rank test is a non parametric statistical hypothesis test used when comparing two related samples, matched samples, or repeated measurements on a single sample to assess whether their population mean ranks differ (i.e. it is a paired difference test)
- It can be used as an alternative to the paired Students t test, *t*-test for matched pairs, or the *t*-test for dependent samples when the population cannot be assumed to be Normally distributed.
- In any event, when the data within two correlated samples fail to meet one or another of the assumptions of the t-test, an appropriate non-parametric alternative can often be found in the Wilcoxon Signed Rank test.
- The test is named for Frank Wilcoxon (1892–1965) who, in a single paper, proposed both it and the rank sum test for two independent samples (Wilcoxon, 1945).
- We use the signed rank test when there are two nominal variables and one ,measurement variable ranked variable. One of the nominal variables has only two values, such as "before" and "after" or "left" and "right," and the other nominal variable identifies the pairs of observations
- ► If the number of observations/pairs is such that n(n+1)/2 is large enough (> 20), a normal approximation can be used with Mean of W = n(n + 1)/4, σW = square root of n(n + 1)(2n + 1)/24
- Obtain W+, the sum of the ranks of the positive differences, and W-, the sum of the ranks of the negative differences.
- Choose the test statistic W = min(W-., W+). Use tables of critical values for the Wilcoxon signed rank sum test to find the probability of observing a value of W or more extreme. Most tables give both one-sided and two-sided p-values. If not, double the one-sided p-value to obtain the two-sided p-value.