Common statistical tests

This table is an extract from the information given in section 9.5 of the book.

Statistic:	**Sample mean values (one or two samples)**
Test:	**Student's *t*-test.**
	Compares the *mean*(*s*) of one or two sets of replicate data. Assumes that data is taken from a *normal* distribution.
	One Sample *t*-test: Compares the mean of the sample data with a specific value See Example 10.1.
	Two Sample *t*-test: Compares the means of two data sample sets. See Example 10.5.
	Paired *t*-test: Compares two sets of replicate data in which pairs of data items from each set have unique relationships. See Example 10.7.

Statistic:	**Sample mean values (multiple samples)**
Test:	**ANOVA – Analysis of Variance**
	Compares the *mean*(*s*) of (usually) more than two sets of replicate data. Assumes that data is taken from a *normal* distribution.
	One-Way ANOVA: Tests for the effect of *one factor* on the mean values of the samples. See Example 11.1.
	Two-Way ANOVA: Tests for the effects of *two factors* on the mean values of the samples. See Example 11.3. A two-way ANOVA *with replication* will also test for an *interaction* between the factors. See Example 11.6.
	GLM – General Linear Model: More flexible implementation of the ANOVA technique to test for multiple factors and interactions. It does not require equal numbers of data values ('balanced') between each combination of factor levels. See Website.
	ANCOVA (analysis of covariance): Performs an ANOVA analysis, when one variable is also dependent on an additional variable. See Website.
	Tukey Test: *Post hoc* test to locate the specific differences between samples following a 'significant' ANOVA result. See Example 11.9.

Statistic:	**Sample variances or standard deviations (two samples)**
Test:	***F*-test.**
	Compares the *variances* of two sets of replicate data. Assumes that data is taken from a *normal* distribution. See Example 10.8.

Statistic:	**Sample medians**
Test:	**Range of non-parametric tests.**
	Compares the *median*(*s*) of sets of replicate data. Does NOT make any assumptions about the distribution of the source data.
	One Sample Wilcoxon test: Compares the median of the sample data set with a specific value. See Example 12.2.
	Two Sample Mann-Whitney *U*-test: Compares the medians of two data sample sets. See Example 12.4.
	Paired Wilcoxon test: Compares two sets of replicate data in which pairs of data items from each set have unique relationships. See Example 12.6.
	One-Way Kruskal-Wallis test: Tests for the effect of *one factor* on the median values of *more than two* sample sets. See Example 12.8.
	Two-Way Friedman test: Tests for the effects of *two factors* on the median values of *more than two* sample sets. See Example 12.10.

Statistic:	**'*x* and *y*' values of two variables**
Test:	**Correlation and Regression**
	Analysis of data in which one variable is expected to change in response to a change in another variable.
	Correlation: Tests whether a significant change in one variable is in proportion to a change in the other variable. See Example 13.2. Pearson's correlation coefficient assumes that data is taken from a normal distribution. Spearman's correlation coefficient does NOT make any assumptions about the distribution of the source data.
	Regression: Once correlation and causation between two variables is confirmed, a regression analysis will calculate the *magnitude* of the effect that one variable has on the other, and produce a 'best-fit' linear model to describe the interaction. 'Regression' is a *calculation* and not, strictly speaking, a test. See Example 4.8.

Statistic:	**Frequencies - counting the numbers in categories**
Test:	**Chi-squared, χ^2, test.**
	Tests whether the observed frequencies of events in (more than two) specific categories could have occurred by chance.
	Contingency table: Tests whether the distribution of frequencies between categories may depend on another factor. See Example 14.1.
	Goodness of fit: Tests whether the distribution of frequencies between categories is consistent with an expected distribution. See Example 14.4.

Statistic:	**Proportions**
Test:	**Fisher's Exact Test**
	Tests whether the observed distribution of frequencies between just two categories could have occurred by chance. Could also be performed by: χ^2–test using the Yates correction – see 14.1.6, Normal distribution approximation – see 14.3.6
	One-proportion: Compares an observed proportion with a specific expected value. See Example 14.6.
	Two-proportion: Compares an observed proportion with another observed proportion. See Example 14.10.