

TEST Statistics master HEPL & HCM (2014-2015)

General:

This test consists of 20 questions. This formative test is purely to test your knowledge of various statistical concepts. It will give you an indication of the need to review some statistical concepts before you enter the master.

Please note that the test is not pre-condition to be admitted for the master.

Number of questions correct: 1-12: insufficient (<5.5 on a scale of 10)

Number of questions correct: 13-15: sufficient (between 5.5 - 6.8)

Number of questions correct: 16-20: good to excellent (between 7.5 - 10)

Questions 1-6: basic knowledge

Questions 7-13: Confidence intervals or hypothesis tests: Parametric tests (z-test or t-test) and Non-parametric tests (sign-test, signed-rank test, Wilcoxon rank sum test).

Questions 14-17: Interpretation of a linear regression

Questions 18-20: Interpretation of a logistic regression

Overview tests:

Table 6.1 (Kirkwood & Sterne) gives an overview for the choice between a z-test, a t-test or a non-parametric test. (page 3)

Table 30.1 (Kirkwood & Sterne) gives an overview of the non-parametric tests and their parametric counterparts. (page 3)

Further reading:

- ❖ Literature Bachelor and pre-master: Kirkwood, B.R. & J. Sterne. 2003. Essential Medical Statistics. Second edition. Oxford: Blackwell Science Ltd.

<http://www.allbookez.com/essential-medical-statistics-betty-kirkwood/>

- Chapters 1-3: Defining the data
- Chapter 4: Computing means, standard deviations, percentiles: chapter 4
- Chapter 5: The Normal distribution
- Chapters 6-8: Confidence intervals and hypothesis tests for 1 mean
- Chapters 6-8: Comparison of two means: confidence intervals and hypothesis tests
- Chapter 30: Non-parametric tests: sign-test, signed-rank test, Wilcoxon rank sum test
- Chapters 10-11: Linear Regression analysis (and correlation)
- Chapter 19: Logistic Regression analysis

- ❖ Literature Master: Charles Wheelan, 2013. Naked Statistics. New York/London: Norton.
- Chapter 2. Descriptive Statistics. Who was the best baseball player of all time? (Mean, median, frequency distribution, standard deviation, percentiles, normal distribution)
- Chapter 3. Deceptive Description. "He's got a great personality!" and other true but grossly misleading statements (precision, accuracy, rates, percentage points, presentation)
- Chapter 4. Correlation. How does Netflix know what movies I like? (correlation)
- Chapter 5. Basic Probability. Don't buy the extended warranty on your \$99 printer (uncertainty, likelihood distributions)
- Chapter 8. The Central Limit Theorem. The LeBron James of statistics

Tables:

Table 6.1 Recommended procedures for constructing a confidence interval. (z' is the percentage point from the normal distribution, and t' the percentage point from the t distribution with $(n - 1)$ degrees of freedom.)

(a) Population standard deviation σ unknown.

Sample size	Population distribution	
	Approximately normal	Severely non-normal*
60 or more	$\bar{x} - (z' \times s/\sqrt{n})$ to $\bar{x} + (z' \times s/\sqrt{n})$	$\bar{x} - (z' \times s/\sqrt{n})$ to $\bar{x} + (z' \times s/\sqrt{n})$
Less than 60	$\bar{x} - (t' \times s/\sqrt{n})$ to $\bar{x} + (t' \times s/\sqrt{n})$	see Chapter 30

(b) Population standard deviation σ known.

Sample size	Population distribution	
	Approximately normal	Severely non-normal*
15 or more	$\bar{x} - (z' \times \sigma/\sqrt{n})$ to $\bar{x} + (z' \times \sigma/\sqrt{n})$	$\bar{x} - (z' \times \sigma/\sqrt{n})$ to $\bar{x} + (z' \times \sigma/\sqrt{n})$
Less than 15	$\bar{x} - (z' \times \sigma/\sqrt{n})$ to $\bar{x} + (z' \times \sigma/\sqrt{n})$	see Chapter 30

*It may be preferable to transform the scale of measurement to make the distribution more normal (see Chapter 13).

Table 30.1 Summary of the main rank order methods. Those described in more detail in this section are shown in italics.

Purpose of test	Method	Parametric counterpart
Examine the difference between paired observations	<i>Wilcoxon signed rank test</i>	Paired t -test
Simplified form of Wilcoxon signed rank test	Sign test	
Examine the difference between two groups	<i>Wilcoxon rank sum test</i>	Two-sample t -test
Alternatives to Wilcoxon rank sum test that give identical results	Mann–Whitney U -test Kendall's S -test	Two-sample t -test
Examine the difference between two or more groups. Gives identical results to Wilcoxon rank sum test when there are two groups	Kruskal–Wallis one-way analysis of variance	One-way analysis of variance
Measure of the strength of association between two variables	<i>Kendall's rank correlation (Kendall's tau)</i>	Correlation coefficient
Alternative to Kendall's rank correlation that is easier to calculate.	<i>Spearman's rank correlation</i>	Correlation coefficient