

Insert title of project here



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Assignment presented in the partial fulfilment
of the requirement for the degree of
BComHons (Financial Risk Management)
at the University of Stellenbosch

Supervisor: Prof. W.J. Conradie

PLAGIARISM DECLARATION

1. Plagiarism is the use of ideas, material and other intellectual property of another's work and to present it as our own.
2. We agree that plagiarism is a punishable offence because it constitutes theft.
3. Accordingly, all quotations and contributions from any source whatsoever (including the internet) have been cited fully. We understand that the reproduction of text without quotation marks (even when the source is cited) is plagiarism.
4. We also understand that direct translations are plagiarism.
5. We declare that the work contained in this assignment, except otherwise stated, is our original work and that we have not previously (in its entirety or in part) submitted it for grading in this assignment or another assignment.

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ACKNOWLEDGEMENTS

The Department of Statistics and Actuarial Science (the Department) wishes to acknowledge David Rodwell for generously creating a template based off the USB (University of Stellenbosch Business School) guidelines which have been adapted for the purposes of the department.

ABSTRACT

Insert an abstract of not more than 500 words here

Key words:

Technical guidelines; Chapter outline; Examples

OPSOMMING

Sluit 'n Afrikaanse opsomming in

Sleutelwoorde:

Tegniese vereistes, Voorgestelde Hoofstukke, Voorbeelde.

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LIST OF ABBREVIATIONS AND/OR ACRONYMS

USB	University of Stellenbosch Business School
Etc	Insert Acronym Here

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

This document serves to aid students in writing their honours projects / masters thesis in LaTeX. The document is to be used in conjunction with the guideline document as provided by the Department of Statistics and Actuarial Science and which is included in the file named Assignment Guideline.

In our experience, many students experience difficulties with the formatting of their reports. It will save you time if your document is in the correct format from the beginning. This template is designed to assist you in writing a report in the correct format as required by the Department of Statistics and Actuarial Science (the Department). The document is written in the format required by the Department and aims to give some practical advice along the way. The headings in this, the first chapter, give the student an indication of the structure of a typical first chapter. Students can adapt these according to their reports, whether it is qualitative or quantitative and whether hypotheses are included. Note that the table of contents does not refer to itself, i.e. it is not an item within the table of contents. The tabs running up to the page numbers do not have any leader characters, i.e. dots.

1.2 PROBLEM STATEMENT

This section states the problem that you are exploring. You should, in this section also state the research question clearly. The difference between the research problem and research question is that the problem is broader, while the research question represents the “one question that you will answer at the end of your report”. The research question therefore is specific, concise, and clear. It is possible to expand the research question by using sub-questions.

1.3 CLARIFICATION OF KEY CONCEPTS

In this section you need to highlight the main concepts that are being used in your assignment. For example, in this particular document the concepts of “report”, “supervisor” etc. are being

discussed.

1.3.1 Report

The report is the product of the research assignment component of the US honours degree.

1.3.2 Supervisor

The supervisor is the person who will guide you in your research. This person is not your language editor or a research assistant.

1.3.3 Editor

An editor is a person who can help you to make sure your document is grammatically and technically correct. Some editors can also translate documents for you, or will comment on chapter or paragraph structure. You can also contact the University of Stellenbosch's Language Centre (<http://www0.sun.ac.za/taalcentrum/student-home.html>) for assistance in writing your report. They provide services from general writing skills through to editing services, the latter service for a fee.

1.3.3.1 Testing

This is how the subsubheadings will appear

CHAPTER 2

USEFUL LATEX COMMANDS

2.1 TABLES

Here below is a preview of how a table will appear,

Table 2.1: Neural network data set

Name of Period	Number of Data Sets
Total data set	4998
Training data set	2820
Test data set	1473
Out-of-sample data set (validation set)	705

2.2 FIGURES

Here below is a preview of how a figure will appear,

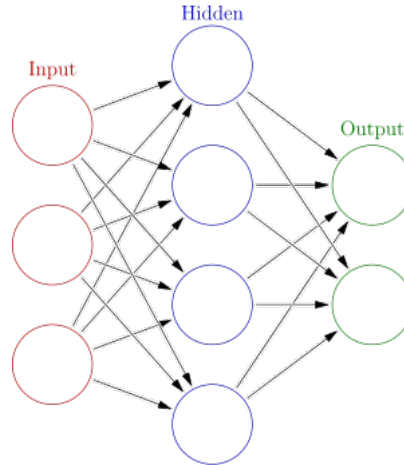


Figure 2.1: Neural Network Structure

2.3 WRITING A SINGLE EQUATION

$$e^i + 1 = 0 \tag{2.1}$$

which is known as Euler's equation.

2.4 DISPLAYING LONG EQUATIONS

$$\begin{aligned} p(x) = 3x^6 + 14x^5y + 590x^4y^2 + 19x^3y^3 & \quad 20x^4z^2 + 17x^2y^3z^4 + 19x^2y^3 & \quad 20x^7z^2 \\ & \quad 12x^2y^4 & \quad 12xy^5 + 2y^6 & \quad a^3b^3 \end{aligned}$$

2.5 ALIGNING SEVERAL EQUATIONS

$$\begin{aligned} 2x - 5y &= 8 \\ 3x + 9y &= 12 \end{aligned}$$

$$\begin{array}{lll} x = y & w = z & a = b + c \\ 2x = y & 3w = \frac{1}{2}z & a = b \\ 4 + 5x = 2 + y & w + 2 = 1 + w & ab = cb \end{array}$$

2.6 GROUPING AND CENTERING EQUATIONS

$$\begin{aligned} 2x - 5y &= 8 \\ 3x^2 + 9y &= 3a + c \end{aligned}$$

2.7 POWERS & INDICES

Powers are inserted using the hat symbol. For example, n^2

Indices are inserted using an underscore. For example, 2_a . If the power or index includes more than one character, group them using curly brackets ..., e.g. b_{a-2} .

2.8 COMPLEX EXAMPLES

$$R^* = \underset{RR^t=I; \det(R)=1}{\operatorname{argmin}} \sum_{i=1}^n \|RX_i - Y_i\|_2^2;$$

$$\frac{d}{dx} \arctan(\sin(x^2)) = 2 \frac{\cos(x^2)x}{2 + (\cos(x^2))^2}$$

Theorem 1 *If $F \in D(G)$ then the existence of a slowly varying function $\hat{\cdot}$ and a function d with $d \in R_0$ and $d(x) \neq 0$ as $x \rightarrow 1$ is implied such that,*

$$\frac{U(ux) - U(x)}{a(x)} = \frac{1}{d(x)} u \frac{\hat{\cdot}(ux) - \hat{\cdot}(x)}{\hat{\cdot}(x)} \quad (2.2)$$

The following result is used namely,

$$\begin{aligned} \frac{\hat{\cdot}(ux) - \hat{\cdot}(x)}{a_2(x)\hat{\cdot}(x)} &= c h(u); \quad c \neq 0 \text{ and } a_2 \in R \\ & \Rightarrow \frac{\hat{\cdot}(ux) - \hat{\cdot}(x)}{a_2(x)\hat{\cdot}(x)} = c h(u) \\ & \Rightarrow \frac{\hat{\cdot}(ux)}{\hat{\cdot}(x)} = 1 + a_2(x)c h(u) \\ & \Rightarrow \frac{\hat{\cdot}(ux)}{\hat{\cdot}(x)} = a_2(x)c h(u) + 1 \end{aligned} \quad (2.3)$$

Substitute RHS of (2.3) into equation given in (2.2) which leads to,

$$\frac{U(ux) - U(x)}{a(x)} = \frac{1}{d(x)} (u (a_2(x)c h(u) + 1) - 1) \quad (2.4)$$

2.9 MATRICES AND SIMULTANEOUS EQUATIONS

Here we have a very simple application of the case statement.

$$f(x) = \begin{cases} 3x + 5y + z \\ 7x - 2y + 4z \\ 6x + 3y + 2z \end{cases}$$

Matrices can be assembled by using the array statement, like in this example:

x_{11} x_{12}

x_{21} x_{22}

x_{11} x_{12}

x_{21} x_{22}

However, there is another statement, the matrix declaration, slightly easier to use:

x y

z v

x y

z v

The frames of the matrix can be displayed in several forms, by just changing the matrix declaration to vmatrix, Vmatrix, bmatrix, Bmatrix or pmatrix, as shown ahead:

$$\begin{array}{cccccccccccc} x & y & x & y & x & y & x & y & \begin{matrix} 2 \\ 4 \end{matrix} & \begin{matrix} 32 \\ 54 \end{matrix} & \begin{matrix} 38 \\ 5 \end{matrix} & \begin{matrix} 98 \\ <x \\ <x \end{matrix} & \begin{matrix} 90 \\ <x \\ <x \end{matrix} & \begin{matrix} 10 \\ @x \\ @x \end{matrix} & \begin{matrix} 1 \\ y_A \\ y_A \end{matrix} \\ z & v & z & v & z & v & z & v & z & v & z & v & z & v & z & v \end{array}$$

As a final example, let us construct more complicated matrices and matricial expressions:

$$\begin{matrix} 2 & 3 \\ 6 & 0 \\ 6 & \ddots \\ 4 & \vdots \\ & 5 \\ & 0 \\ & 0 \end{matrix} \quad \begin{matrix} 3 \\ 7 \\ 7 \\ 5 \\ 5 \\ 0 \\ 0 \end{matrix}$$

Now, we will show a first matricial expression:

$$\begin{matrix} 2 & 3 & 2 & 3 & 2 & 3 & 2 & 3 & 2 & 3 & 2 & 3 \\ 4 & x_1 & 5 = 4 & A & B_5 & 4 & y_1 & 5 & 4 & x_1 & 5 = 4 & A & B_5 & 4 & y_1 & 5 \\ & x_2 & & C & D & & y_2 & & x_2 & & C & D & & y_2 \end{matrix}$$

and, here is another example, now using two kinds of vectors:

$$\begin{matrix} 2 & 3 & 2 & 3 \\ 4 & xz & xw & 5 = 4 & x & 5 & h & i \\ & yz & yw & & y & & z & w \end{matrix}$$

2.10 GREEK LETTERS

Greek letters can be typed in math mode using the name of the letter preceded by a backslash. Many Greek capital letters are used in the Latin 25 alphabet — for those that are different capitalise the first letter of the name to produce a capital Greek letter. For example — Δ ; Θ ; Π ; Σ ; Φ ; Ψ ; Ω

2.11 BIBTEX COMMANDS

The bibliography in this template is automatically generated through the use of BibTeX. The particular style of referencing is governed by the `usmeg-a.bst` file which follows the Stellenbosch University Harvard style referencing.

The references within this template are stored in the `biblist.bib` file. The necessary citations for in-text referencing are controlled through the following commands,

Beirlant *et al.* (2006)

Beirlant *et al.* (2006)

(Beirlant *et al.*, 2006)

(Beirlant, Goegebeur, Segers and Teugels, 2006)

(Beirlant *et al.*, 2006, chap. 2)

(e.g. Beirlant *et al.*, 2006)

Beirlant *et al.*

Beirlant, Goegebeur, Segers and Teugels

2.11.1 Updating BibTeX file using Google Scholar

In order to use different in-text references the `biblist.bib` file should be updated to include the relevant citation. These entries into the `biblist` file can be obtained through Google Scholar using the following steps.

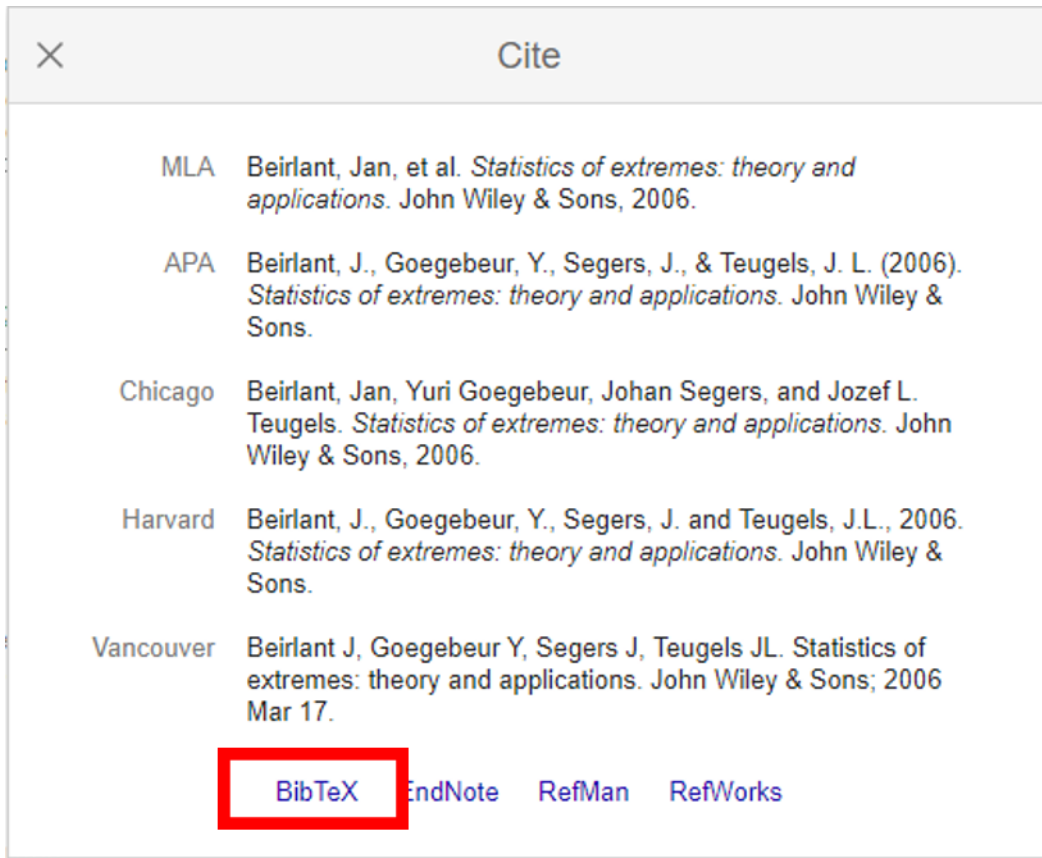
Step 1: Search for the necessary citation required. In this example the book *Statistics of Extremes* is used.

The screenshot shows the Google Scholar search interface. The search bar contains 'statistics of extremes' and shows 'About 643,000 results (0.05 sec)'. On the left, there are filters for 'Any time' (Since 2019, 2018, 2015, Custom range...), 'Sort by relevance' (Sort by date), and checkboxes for 'include patents' and 'include citations'. Two book results are shown. The first result is '[BOOK] Statistics of extremes' by E.J. Gumbel (2012), with a citation count of 7537. The second result is '[BOOK] Statistics of extremes: theory and applications' by J. Beirlant, Y. Goegebeur, J. Segers, and J.L. Teugels (2006), with a citation count of 1993. This second result is highlighted with a red rectangular box.

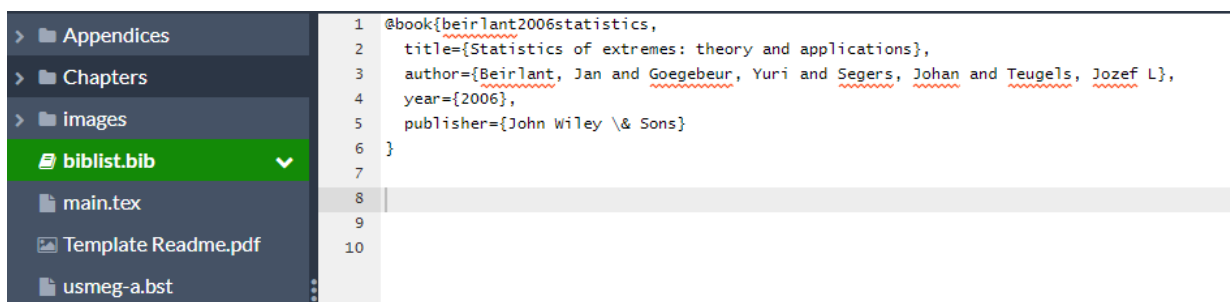
Step 2: Click on the quotation icon as shown below,

This screenshot is identical to the one above, but the citation icon (represented by a pair of double quotes) for the second result, '[BOOK] Statistics of extremes: theory and applications', is highlighted with a red rectangular box.

Step 3: Click on the area labelled BibTeX as shown below,



Step 4: Copy the text shown in the browser and paste it in the `biblist.bib` file,



The citation can now be accessed within your document using one of the citation commands above. The key of the citation is listed just after the curly bracket in the `biblist` entry. The key can be changed if text is too long or inconvenient.

REFERENCES

Beirlant, J., Goegebeur, Y., Segers, J. and Teugels, J.L. (2006). *Statistics of extremes: theory and applications*. John Wiley & Sons.

APPENDIX A

QUESTIONNAIRE

This is how an appendix is given. It has a heading just like a chapter and title describing the appendix. Whenever it is referred to in the main section of the report, it is referred to as Appendix A.

This might include your questionnaire, feedback from respondents, maps, etc. If you have any figures or tables here, number them according to the appendix, e.g. Figure A.1 would be the first figure in Appendix A.

APPENDIX B
USB STYLE SHEETS