

Thesis Title

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This is to certify that I have examined this copy of a doctoral dissertation by

A. U. Thor

and have found that it is complete and satisfactory in all respects,
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Abstract

Thesis Title

by A. U. Thor

Chair of Supervisory Committee:

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This sample dissertation is an aid to students who are attempting to format their theses with \LaTeX , a sophisticated text formatter widely available at the University of Washington and other institutions of higher learning.

It describes the use of a specialized macro package developed specifically for thesis production at the University. The macros customize \LaTeX for the correct thesis style, allowing the student to concentrate on the substance of his or her text.

It demonstrates the solutions to a variety of formatting challenges found in thesis production.

It serves as a template for a real dissertation.

TABLE OF CONTENTS

List of Figures	ii
List of Tables	iii
Glossary	iv
Chapter 1: Sample Mathematics and Text	1
1.1 In-line and Displayed Mathematics	1
1.2 Mathematics in Section Heads $\int_{\alpha}^{\beta} \ln t dt$	2
1.3 Theorems, Lemmata, and Other Theorem-like Environments	2
Appendix A: Proving $E = MC^2$	3
Appendix B: Derivation of $A = \pi r^2$	4
Bibliography	6

LIST OF FIGURES

LIST OF TABLES

GLOSSARY

ARGUMENT: replacement text which customizes a \LaTeX macro for each particular usage.

BACK-UP: a copy of a file to be used when catastrophe strikes the original. People who make no back-ups deserve no sympathy.

CONTROL SEQUENCE: the normal form of a command to \LaTeX .

DELIMITER: something, often a character, that indicates the beginning and ending of an argument. More generally, a delimiter is a field separator.

DOCUMENT CLASS: a file of macros that tailors \LaTeX for a particular document. The macros described by this thesis constitute a document class.

DOCUMENT OPTION: a macro or file of macros that further modifies \LaTeX for a particular document. The option `[chapternotes]` constitutes a document option.

FIGURE: illustrated material, including graphs, diagrams, drawings and photographs.

FONT: a character set (the alphabet plus digits and special symbols) of a particular size and style. A couple of fonts used in this thesis are twelve point roman and *twelve point roman slanted*.

FOOTNOTE: a note placed at the bottom of a page, end of a chapter, or end of a thesis that comments on or cites a reference for a designated part of the text.

FORMATTER: (as opposed to a word-processor) arranges printed material according to instructions embedded in the text. A word-processor, on the other hand, is normally controlled by keyboard strokes that move text about on a display.

\LaTeX : simply the ultimate in computerized typesetting.

MACRO: a user-defined control sequence.

MACRO PACKAGE: a set of macros that combine for a single purpose. These thesis macros constitute a macro package.

PICA: a unit of length. One pica is twelve points and six picas is about an inch.

POINT: a unit of length. 72.27 points equals one inch.

ROMAN: a conventional printing typestyle. This thesis is set in roman type.

RULE: a straight printed line; e.g., _____.

TABLE: information placed in a columnar arrangement.

THESIS: either a master's thesis or a doctoral dissertation. This document also refers to itself as a thesis, although it really is not one.

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DEDICATION

To Mother

Chapter 1

SAMPLE MATHEMATICS AND TEXT

1.1 In-line and Displayed Mathematics

The expression $\sum_{i=1}^{\infty} a_i$ is in-line mathematics, while the numbered equation

$$\sum_{i=1}^{\infty} a_i \tag{1.1}$$

is displayed and automatically numbered as equation 1.1.

Let H be a Hilbert space, C be a closed bounded convex subset of H , T a non-expansive self map of C . Suppose that as $n \rightarrow \infty$, $a_{n,k} \rightarrow 0$ for each k , and $\gamma_n = \sum_{k=0}^{\infty} (a_{n,k+1} - a_{n,k})^+ \rightarrow 0$. Then for each x in C , $A_n x = \sum_{k=0}^{\infty} a_{n,k} T^k x$ converges weakly to a fixed point of T .

Two sets of L^AT_EX parameters govern mathematical displays.¹ The spacing above and below a display depends on whether the lines above or below are short or long, as shown in the following examples.

A short line above:

$$x^2 + y^2 = z^2$$

and a short line below.

A long line above may depend on your margins

$$\sin^2 \theta + \cos^2 \theta = 1$$

as will a long line below. This line is long enough to illustrate the spacing for mathematical displays, regardless of the margins.

¹L^AT_EX automatically selects the spacing depending on the surrounding line lengths.

1.2 Mathematics in Section Heads $\int_{\alpha}^{\beta} \ln t dt$

Mathematics can appear in section heads. Note that mathematics in section heads may cause difficulties in typesetting styles with running headers or table of contents entries.

1.3 Theorems, Lemmata, and Other Theorem-like Environments

A number of theorem-like environments is available. The following lemma is a well-known fact on differentiation of asymptotic expansions of analytic functions.

Lemma 1 *Let $f(z)$ be an analytic function in \mathbb{C}_+ . If $f(z)$ admits the representation*

$$f(z) = a_0 + \frac{a_1}{z} + o\left(\frac{1}{z}\right),$$

for $z \rightarrow \infty$ inside a cone $\Gamma_{\varepsilon} = \{z \in \mathbb{C}_+ : 0 < \varepsilon \leq \arg z \leq \pi - \varepsilon\}$ then

$$a_1 = -\lim_{z \rightarrow \infty, z \in \Gamma_{\varepsilon}} z^2 f'(z), \quad (1.2)$$

Proof. Change z for $1/z$. Then $\Gamma_{\varepsilon} \rightarrow \bar{\Gamma}_{\varepsilon} = \{z \in \mathbb{C}_- : \bar{z} \in \Gamma_{\varepsilon}\}$ and

$$f(1/z) = a_0 + a_1 z + o(z). \quad (1.3)$$

Fix $z \in \bar{\Gamma}_{\varepsilon}$, and let $C_r(z) = \{\lambda \in \mathbb{C}_- : |\lambda - z| = r\}$ be a circle with radius $r = |z| \sin \varepsilon/2$.

It follows from (1.3) that

$$\frac{1}{2\pi i} \int_{C_r(z)} \frac{f(\lambda) d\lambda}{(\lambda - z)^2} = \sum_{m=0}^1 a_m \frac{1}{2\pi i} \int_{C_r(z)} \frac{(\lambda - z_0)^m d\lambda}{(\lambda - z)^2} + R(z), \quad (1.4)$$

where for the remainder $R(z)$ we have

$$\begin{aligned} |R(z)| &\leq r^{-1} \max_{\lambda \in C_r(z)} o(|z|) = r^{-1} \max_{\lambda \in C_r(z)} |\lambda| \cdot O(|z| + r) \\ &= \frac{|z| + r}{r} \cdot O(|z| + r) = \frac{1 + \sin \varepsilon}{\sin \varepsilon} \cdot O(|z|). \end{aligned}$$

Therefore $R(z) \rightarrow 0$ as $z \rightarrow \infty, z \in \bar{\Gamma}_{\varepsilon/2}$, and hence by the Cauchy theorem (1.4) implies

$$\frac{d}{dz} f(1/z) = a_1 + R(z) \rightarrow a_1, \text{ as } z \rightarrow \infty, z \in \bar{\Gamma}_{\varepsilon/2},$$

that implies (1.2) by substituting $1/z$ back for z . ■

Appendix A

PROVING $E = MC^2$

I refer the reader to many of grandpa's famous books on this subject.

Appendix B

DERIVATION OF $A = \pi R^2$

A circle is really a square without corners. QED.

VITA

Arthor U. Thor was born in an insignificant town whose only claim to fame is that it produced such a fine specimen of a researcher.

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