This is the Name of my Thesis

by

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This thesis entitled:
This is the Name of my Thesis
written by I. B. Scriptor
has been approved for the Department of Rocket Science

Ed Visor

Prof. Rachel Goddard

Ms. Thora Nea

Date ____________________

The final copy of this thesis has been examined by the signatories, and we find that both the content and the form meet acceptable presentation standards of scholarly work in the above mentioned discipline.

Scriptor, I. B. (Ph.D., Rocket Science)

This is the Name of my Thesis

Thesis directed by Prof. Ed Visor

Often the abstract will be long enough to require more than one page, in which case the macro "\OnePageChapter" should *not* be used.

But this one isn't, so it should.

Dedication

To all of the fluffy kitties.

Acknowledgements

Here's where you acknowledge folks who helped. But keep it short, i.e., no more than one page, as required by the Grad School Specifications.

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Chapter 1

Introduction

This sample document illustrates how to use the `thesis` class, originally written by John P. Weiss. Some requirements of the Graduate School are written into that file; page size, line spacing, appropriate placement of captions for tables and figures, etc. Other tasks of conforming to the requirements are left to other existing LaTeX packages. For example, a common problem is to insert graphics — figures and tables — into the body of the thesis. For this one should use the `graphicx` package, which is part of the standard TeX distribution. Likewise, the Grad School specs say that a large table may be displayed in landscape mode at reduced size, but its caption must also be in rotated position, in the same font and size as the normal text in the body of the thesis. To accomplish this, the user must invoke the `rotating` package, available online.

Figure 1.1 shows something or other; the image is from a PDF file imported into this document using the `graphicx` package. The command `\usepackage{graphicx}`, which appears near the very top of the main LaTeX file, reads in this package which defines the `\includegraphics{}` macro.

1.1 Lists in `thesis` class

In `thesis` class (for Colorado University), lists are defined so that nested lists will be numbered or marked appropriately. First, an itemized (non-enumerated) list prefaces each item with a bullet. Nested itemized list use asterisks, then dashes, then dots. These lists are typed between the `\begin{itemize}` and `\end{itemize}` commands.

- This is “itemized” item A.

Figure 1.1: This diagram of a cylinder and various measurements and quantities was actually made using **xfig**, a freeware drawing program for Unix systems. Diagrams can be exported directly to PDF files, the preferred format for vector graphics. Vector graphics can be magnified indefinitely without degradation, whereas bitmap images (JPG and PNG) must be pretty high-resolution if you don't want them looking all pixellated when magnified.

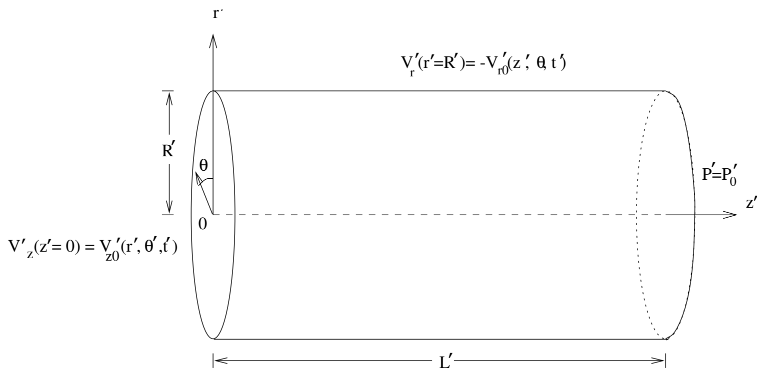
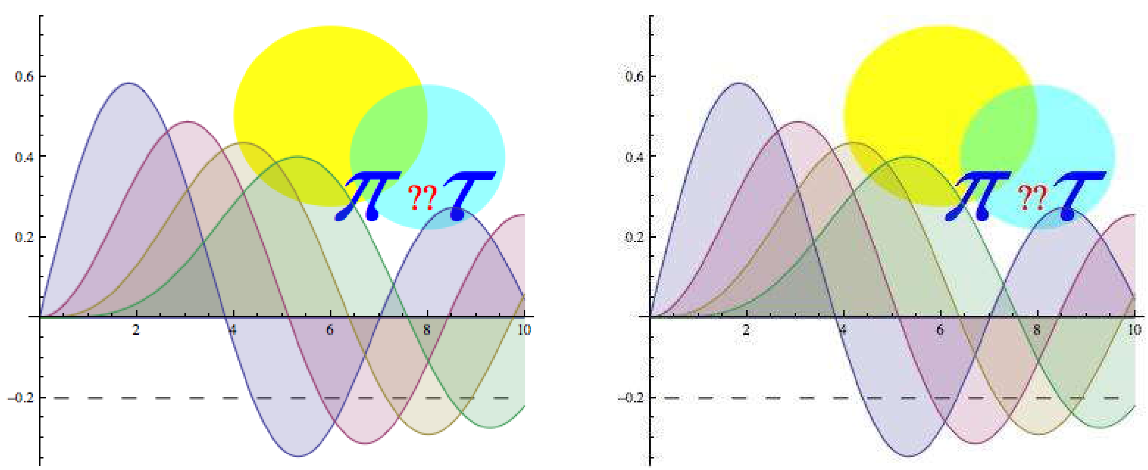


Figure 1.2: The JPEG bitmap format is great for photos but crummy for diagrams (including drawings, graphs, charts) because it can't gracefully handle sharp edges. Note the same bitmap image below from a PNG file and from a JPG file; the latter shows characteristic "ringing" at sharp edges – including text! Vector-format PDF is the best for diagrams, but if you must use a bitmap image, let it be PNG. (Left: file *drawing.png*. Right: file *drawing.jpg*.)



- This is “itemized” item B.
- This is “itemized” item C.
    - ∗ This is “itemized” subitem A.
        - – This is “itemized” subsubitem A.
            - · This is “itemized” subsubsubitem A.
        - – This is “itemized” subsubitem B.
    - ∗ This is “itemized” subitem B.
- This is “itemized” item D.

Enumerated lists use the commands `\begin{enumerate}` and `\end{enumerate}`, and nested enumerations appear like this.

(1) This is “enumerated” item A.

(2) This is “enumerated” item B.

(3) This is “enumerated” item C.

    (a) This is “enumerated” subitem A.

        (i) This is “enumerated” subsubitem A.

            (i.a) This is “enumerated” subsubsubitem A.

        (ii) This is “enumerated” subsubitem B.

    (b) This is “enumerated” subitem B.

(4) This is “enumerated” item D.

The work presented here[1] is an extension of Lao[**?**] and Lao et al.[**?**], fictional references that are in the bibliographic source file `refs.bib`.

[1] Footnotes are handled neatly by LaTeX.

Table 1.1: Here is an example of a table with its own footnotes. Don't use the `\footnote` macro if you don't want the footnotes at the bottom of the page. Also, note that in a thesis the caption goes **above** a table, unlike figures.

wave form	S (kVA)	P (kW)	Q^* (kVAr)	$D^\dagger$ (kVAd)
Fig. 1.1a	25.48	25.00	-2.82	4.03
Fig. 1.1b	25.11	18.02	-9.75	14.52
Table 2.1	24.98	22.26	9.19	6.64
Table 1.1	23.48	15.00	6.59	16.82
Fig. 2.1	24.64	22.81	-0.44	9.3

*kVAr means reactive power.
†kVAd means distortion power.

Chapter 2

Mathematical Formulation

The objective of this fake thesis document is to demonstrate a multitude of LaTeX features as well as features specific to the thesis class. We start by giving one short formula, and one big hairy multi-line formula (one of the non-dimensional Navier-Stokes equations):

$$A = \pi r^2 \tag{2.1}$$

$$\begin{aligned}
\rho\left[\frac{DV_r}{Dt} - M\epsilon^2\frac{V_\theta^2}{r}\right] \quad = \quad & -\frac{\delta^2}{\gamma\ M}\frac{\partial P}{\partial r} + \frac{M\ \delta^2}{Re}\left\{2\frac{\partial}{\partial r}\left[\mu\left(\frac{\partial V_r}{\partial r} - \frac{1}{3}\nabla\cdot\overline{\mathbf{V}}\right)\right]\right. \\
& +\frac{1}{r}\frac{\partial}{\partial\theta}\left[\mu\left(\frac{1}{r}\frac{\partial V_r}{\partial\theta} + \epsilon\frac{\partial V_\theta}{\partial r} - \epsilon\frac{V_\theta}{r}\right)\right] \\
& +\frac{\partial}{\partial z}\left[\mu\left(\frac{1}{\delta^2}\frac{\partial V_r}{\partial z} + \frac{\partial V_z}{\partial r}\right)\right] \\
& \left.+2\ \frac{\mu}{r}\left[\frac{\partial V_r}{\partial r} - \frac{\epsilon}{r}\frac{\partial V_\theta}{\partial\theta} - \frac{V_r}{r}\right]\right\},
\end{aligned} \tag{2.2}$$

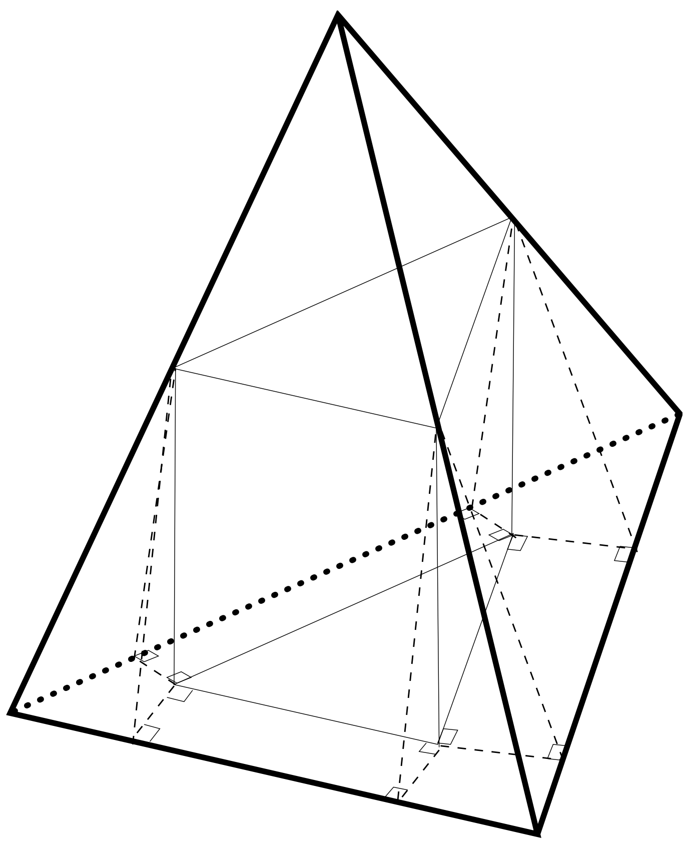
2.1 Explanation of equations

The latter equation is non-dimensionalized using the following definitions:

$$r = \frac{r'}{R'}, \quad z = \frac{z'}{L'}, \quad t = \frac{t'}{t'_a}, \quad \kappa = \frac{\kappa'}{\kappa'_0}, \quad \mu = \frac{\mu'}{\mu'_0}, \quad C_V = \frac{C'_V}{C'_{V0}},$$

where P'_0 is the initial static pressure in the cylinder, and ρ'_0 and T'_0 are the density and temperature of the fluid being injected from the sidewall.

Figure 2.1: A triangular pyramid may be cut up as shown, to yield one top pyramid (with one-eighth the volume of the full pyramid), three bottom corner pyramids (which, when joined, are congruent to the top pyramid), three prisms along the bottom edges (the area of whose bottom faces total $B/2$) and the large central prism (volume $= (B/4)(h/2) = Bh/8$). The image, from PDF file "pyr.pdf", was read in using the \includegraphics command, from the graphicx package.



Here is an example of using the macros `\singlespacing` and `\doublespacing`:

This paragraph was preceded by the command `\singlespacing`. See the Specifications of the Grad School for instructions about when single spacing is appropriate in a thesis.

And now, here is an example of using the macros `\begin{singlespace}` and `\end{singlespace}`; another way to get single-spacing.

Two cases are studied in the present work which differ only in the boundary conditions. Each different boundary condition model a different source of instability. The boundary of the first case consists of a steady, axisymmetric sidewall radial velocity boundary and a time-dependent, non-axisymmetric endwall axial velocity boundary. The second case is studied with a fixed impermeable axial velocity along the endwall and a combination axisymmetric steady and non-axisymmetric unsteady radial velocity along the sidewall.

Usually you want to use a table produced by some other software, such as Excel, rather than try to do it using LaTeXmacros. If the table is saved/printed to a PDF file, then it can be displayed using the `\includegraphics` macro inside a `table` environment:

Some of the boundary conditions are:

$$z = 0; \qquad V_z = \begin{cases} 0, & t \leq 0 \\ \widetilde{F}_{zw}(r, \theta, t), & t > 0 \end{cases} \tag{2.3}$$

$$z = 0; \qquad V_\theta = V_r = 0 \tag{2.4}$$

$$r = 0; \qquad P, \rho, T, V_r, V_\theta, V_z \text{ finite}, \tag{2.5}$$

$$r = 1; \qquad V_r = F_{rws}(z), \tag{2.6}$$

$$r = 1; \qquad V_z = V_\theta = 0, \tag{2.7}$$

and solutions must be periodic in θ.

If you don't believe this stuff, check out Mulick[**?**] and Baylor[**?**].

Table 2.1: This table wasn't constructed with LaTeX commands, but resides in PDF file (`tableD.pdf`) created by some other software.

n	**n^2**	**n^3**	**n^4**	**n^7**	**n^{13}**
2	4	8	16	128	8192
3	9	27	81	2187	1594323
4	16	64	256	16384	67108864
5	25	125	625	78125	1220703125
6	36	216	1296	279936	13060694016
7	49	343	2401	823543	96889010407

2.2 Yet another section

2.2.1 Just meaningless text to test lines per page

According to the Grad School specs. there should be 24–27 lines of print per page of a thesis. This should be true whether the font size is 10, 11, or 12. Count them up; does this document conform? According to the Grad School specs. there should be 24–27 lines of print per page of a thesis. This should be true whether the font size is 10, 11, or 12. Count them up; does this document conform? According to the Grad School specs. there should be 24–27 lines of print per page of a thesis. This should be true whether the font size is 10, 11, or 12. Count them up; does this document conform? According to the Grad School specs. there should be 24–27 lines of print per page of a thesis. This should be true whether the font size is 10, 11, or 12. Count them up; does this document conform? According to the Grad School specs. there should be 24–27 lines of print per page of a thesis. This should be true whether the font size is 10, 11, or 12. Count them up; does this document conform? According to the Grad School specs. there should be 24–27 lines of print per page of a thesis. This should be true whether the font size is 10, 11, or 12. Count them up; does this document conform? According to the Grad School specs. there should be 24–27 lines of print per page of a thesis. This should be true whether the font size is 10, 11, or 12. Count them up; does this document conform? According to the Grad School specs. there should be 24–27 lines of print per page of a thesis. This should be true whether the font size is 10, 11, or 12. Count them up; does this document conform? According to the Grad School specs. there should be 24–27 lines of print per page of a thesis. This should be true whether the font size is 10, 11, or 12. Count them up; does this document conform? According to the Grad School specs. there should be 24–27 lines of print per page of a thesis. This should be true whether the font size is 10, 11, or 12. Count them up; does this document conform? According to the Grad School specs. there should be 24–27 lines of print per page of a thesis. This should be true whether the font size is 10, 11, or 12. Count them up; does this document conform? According to the Grad School specs. there should be 24–27 lines of print per page of a thesis. This should be true whether the font size is 10, 11, or 12. Count them up; does this document conform? According to the Grad School specs. there should be 24–27 lines of print per page of a thesis. This should be true whether the font size is 10, 11, or 12. Count them up; does this document conform? According to the Grad School specs. there should be 24–27 lines of print per page of a thesis. This should be true whether the font size is 10, 11, or 12. Count them up; does this document conform? According to the Grad School specs. there should be 24–27 lines of print per page of a thesis. This should be true whether the font size is 10, 11, or 12. Count them up; does this document conform? According to the Grad School specs. there should be 24–27 lines of print per page of a thesis. This should be true whether the font size is 10, 11, or 12. Count them up; does this document conform?

What is it? This is a labelled paragraph. The heading of the paragraph is emphasized. This is a labelled paragraph. The heading of the paragraph is emphasized.

2.2.2 This is a subsection

This is a subsection. Filler filler filler filler filler filler filler filler. Filler filler filler filler filler filler filler filler.

2.2.3 This is another subsection

This is another subsection. Filler filler filler filler filler filler filler filler. Filler filler filler filler filler filler filler filler.

This is paragraph number 2. It used a `\paragraph{}` header, which are always inlined (with extra space) and boldfaced.

This is the third paragraph of the subsection. Filler filler filler filler filler filler filler filler. Filler filler filler filler filler filler filler filler.

2.2.3.1 This is a subsubsection (1)

This is the first paragraph of the subsubsection. Whether it is numbered or inlined depends on the option selected at the beginning of the thesis.

By default, a `\subsubsection` heading is numbered and set off on a separate line, left-justified.

However. Using the `inlineh4` option, subsubsection headers are inlined. And using the `nonumh4` option suppresses numbering of the subsubsections. Together they make subsubsection headings just the same as paragraph headings.

2.2.3.2 This is another subsubsection (2)

Once again, whether its heading is numbered and/or inlined depends on the class options chosen at the start.

There is no "subsubsubsection" entity, and "subparagraph" gets no special treatment in **thesis** class.

2.3 The End

Finally, this is the end. The bibliography starts on the next page.

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Appendix A

Weird Exam Answers

About appendices: Each appendix follow the same page-numbering rules as a regular chapter; the first page of a (multi-page) appendix is not numbered. By the way, the following are supposedly authentic answers to English GCSE exams!

(1) The Greeks were a highly sculptured people, and without them we wouldn't have history. The Greeks also had myths. A myth is a female moth.

(2) Actually, Homer was not written by Homer but by another man of that name.

(3) Socrates was a famous Greek teacher who went around giving people advice. They killed him. Socrates died from an overdose of wedlock. After his death, his career suffered a dramatic decline.

(4) Julius Caesar extinguished himself on the battlefields of Gaul. The Ides of March murdered him because they thought he was going to be made king. Dying, he gasped out: Tee hee, Brutus.

(5) Nero was a cruel tyranny who would torture his subjects by playing the fiddle to them.

(6) In midevil times most people were alliterate. The greatest writer of the futile ages was Chaucer, who wrote many poems and verses and also wrote literature.

(7) Another story was William Tell, who shot an arrow through an apple while standing on his sons head.

(8) Writing at the same time as Shakespeare was Miguel Cervantes. He wrote Donkey Hote. The next great author was John Milton. Milton wrote Paradise Lost. Then his wife died and he wrote Paradise Regained.

(9) During the Renaissance America began. Christopher Columbus was a great navigator who discovered America while cursing about the Atlantic. His ships were called the Nina, the Pinta, and the Santa Fe.

(10) Gravity was invented by Issac Walton. It is chiefly noticeable in the autumn when the apples are falling off the trees.

(11) Johann Bach wrote a great many musical compositions and had a large number of children. In between he practiced on an old spinster which he kept up in his attic. Bach died from 1750 to the present. Bach was the most famous composer in the world and so was Handel. Handel was half German half Italian and half English. He was very large.

(12) Soon the Constitution of the United States was adopted to secure domestic hostility. Under the constitution the people enjoyed the right to keep bare arms.

(13) The sun never set on the British Empire because the British Empire is In the East and the sun sets in the West.

(14) Louis Pasteur discovered a cure for rabbis. Charles Darwin was a naturalist who wrote the Organ of the Species. Madman Curie discovered radio. And Karl Marx became one of the Marx brothers.

Appendix B

Ode to Spot

(Data, Stardate 1403827) (A one-page chapter — page must be numbered!) Throughout the ages, from Keats to Giorchamo, poets have composed "odes" to individuals who have had a profound effect upon their lives. In keeping with that tradition I have written my next poem . . . in honor of my cat. I call it. . . Ode. . . to Spot. (Shot of Geordi and Worf in audience, looking mystified at each other.)

> Felus cattus, is your taxonomic nomenclature
> an endothermic quadruped, carnivorous by nature?
> Your visual, olfactory, and auditory senses
> contribute to your hunting skills, and natural defenses.
> I find myself intrigued by your sub-vocal oscillations,
> a singular development of cat communications
> that obviates your basic hedonistic predilection
> for a rhythmic stroking of your fur to demonstrate affection.
> A tail is quite essential for your acrobatic talents;
> you would not be so agile if you lacked its counterbalance.
> And when not being utilized to aid in locomotion,
> It often serves to illustrate the state of your emotion.

(Commander Riker begins to applaud, until a glance from Counselor Troi brings him to a halt.) Commander Riker, you have anticipated my denouement. However, the sentiment is appreciated. I will continue.

> O Spot, the complex levels of behavior you display
> connote a fairly well-developed cognitive array.
> And though you are not sentient, Spot, and do not comprehend
> I nonetheless consider you a true and valued friend.