SECURE DATA STRUCTURES AND THEIR APPLICATIONS

By

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OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
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To Julia

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LIST OF ABBREVIATIONS

$\sum$	Denotes the summation of a series of terms
$\bigcap$	A really big bigcap
fractal	A geometric pattern that is repeated at ever smaller scales to produce irregular shapes and surfaces that cannot be represented by classical geometry. Fractals are used especially in computer modeling of irregular patterns and structures in nature.
polynomial	(in one variable) an expression consisting of the sum of two or more terms each of which is the product of a constant and a variable raised to an integral power: $ax^2 + bx + c$ is a polynomial, where a, b, and c are constants and x is a variable.

Abstract of Dissertation Presented to the Graduate School
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SECURE DATA STRUCTURES AND THEIR APPLICATIONS

By

Sam A. Markelon

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Chair: Vincent Bindschaedler
Major: Computer Science

This is the abstract tex file, which should have been set in the main file using the command `\setAbstractFile{Drive:/file/location/abstractFile}`.

This is what will appear in the place of an abstract, no formatting or other content is needed, just fill this file with your actual abstract, eg; In this paper we give examples of the various files and configurations used in the graduate school LaTeX template for dissertations and thesis papers. It should be 350 words or less.

CHAPTER 1
INTRODUCTION AND OPENING REMARKS

We automatically capitalize all chapters, but if you need to suppress this you can use the class option “overrideTitles” and/or “overrideChapter” to allow you to use non-capitalized letters in the title and/or chapter names respectively. For more detailed information on the template’s features and options, see the included file “ufdissertation-Doc-and-Troubleshooting”.

We don’t recommend that you change much of anything in the class file unless you’re absolutely sure of what your are doing.[1]

1.1 First-Level Heading or Section Heading

This is a first-level or Section heading. They should always be in Title-Case. Title case is where all principal words are capitalized except prepositions, articles, and conjunctions. All non-chapter headers must be capitalized manually.

1.1.1 Second-Level or Subsection Heading

This is a second-level or subsection heading. They will always be in title-case but are left-aligned.

1.1.1.1 Third-Level or Subsubsections

The third level subheadings are left-aligned but in sentence case. Only the first letter and any proper nouns are capitalized.

1.1.1.2 If you divide a section, you must divide it into two, or more, parts

What this means is that if you are going to break down text via subheading, you will want to make sure it is paired with at least one other subheading of the same ”level.”

Paragraph headings. There is no official fourth level heading. Do not use the Paragraph heading feature in LaTeX, simply apply the bold characteristic to the first few words of a paragraph followed by a colon or period.

∗ An un-numbered footnote - this is how you tell the readers that this chapter was previously published and then cite the Journal where it was published. It is typically formatted like ”Reprinted with permission from [citation]”

1 and now we’re back to normal footnote marking

1.1.2 Subsection

Ω Aliquam mi nisi, tristique at rhoncus quis, consectetur non mi. Phasellus blandit quam ligula, a viverra lacus commodo at. In iaculis nisl vel pretium sollicitudin. In efficitur massa vel elit sollicitudin, vel auctor sapien cursus. Proin feugiat sapien a mi tempus;

$$X - X' = D + D' \tag{1-1}$$

Augue sapien mattis leo, nec accumsan turpis quam at neque. Ut pellentesque velit sed placerat cursus. Integer congue urna non massa dictum, a pellentesque arcu accumsan. Nulla posuere, elit accumsan eleifend elementum, ipsum massa tristique metus, in ornare neque nisl sed odio. Nullam eget elementum nisi. Duis a consectetur erat, sit amet malesuada sapien. Aliquam nec sapien et leo sagittis porttitor at ut lacus. Vivamus vulputate elit vitae libero condimentum dictum. Nulla facilisi. Quisque non nibh et massa ullamcorper iaculis. Augue sapien mattis leo, nec accumsan turpis quam at neque. Ut pellentesque velit sed placerat cursus. Integer congue urna non massa dictum, a pellentesque arcu accumsan. Nulla posuere, elit accumsan eleifend elementum, ipsum massa tristique metus, in ornare neque nisl sed odio. Nullam eget elementum nisi. Duis a consectetur erat, sit amet malesuada sapien. Aliquam nec sapien et leo sagittis porttitor at ut lacus. Vivamus vulputate elit vitae libero condimentum dictum. Nulla facilisi. Quisque non nibh et massa ullamcorper iaculis.

> This is an example of a block quote. Aliquam mi nisi, tristique at rhoncus quis, consectetur non mi. Phasellus blandit quam ligula, a viverra lacus commodo at.

1.1.3 Subsection

Aliquam mi nisi, tristique at rhoncus quis, consectetur non mi. Phasellus blandit quam ligula, a viverra lacus commodo at. In iaculis nisl vel pretium sollicitudin. In efficitur massa vel elit sollicitudin, vel auctor sapien cursus. Proin feugiat sapien a mi tempus;

$$X - X' = D + D' \tag{1-2}$$

in consequat augue cursus. Nulla sed sagittis purus. Nunc eu consequat orci, eu laoreet enim. Ut euismod tincidunt sem, eget lacinia dui luctus eu. Aliquam mi augue, faucibus id semper vitae, porta ac ligula. Morbi sed ultrices odio. Mauris id luctus ex. Nulla ac libero dictum, interdum turpis lacinia, scelerisque leo. Praesent varius orci ac eros varius pharetra.

1.1.4 Subsection

Donec convallis scelerisque ante, in sollicitudin orci laoreet eu. Nam arcu magna, semper vel lorem eu, venenatis ultrices est. Nam aliquet ut erat ac scelerisque. Maecenas ut molestie mi. Phasellus ipsum magna, sollicitudin eu ipsum quis, imperdiet cursus turpis. Etiam pretium enim a fermentum accumsan. Morbi vel vehicula enim.

1.2 Objects

Require: $n \geq 0$
Ensure: $y = x^n$
  $y \leftarrow 1$
  $X \leftarrow x$
  $N \leftarrow n$
  while $N \neq 0$ **do**
    if N is even **then**
      $X \leftarrow X \times X$
      $N \leftarrow \frac{N}{2}$
      $y \leftarrow y \times X$
      $N \leftarrow N - 1$
    end if
  end while

Object 1-1. An algorithm with caption. Example from Overleaf. Change style of Algorithm on line 67 of the .cls file

Please note, the 'Objects' section of this document is based off of the Algorithm environment. If you wish to use external links to a repository, UF recommends using Zenodo (https://guides.uflib.ufl.edu/etds/supplemental). Please reach out to our office at TandDSupport-hd@ufl.edu if you have any questions about adding it to your document, and the ETD team at the library if you have any questions about external repositories (IRManager@uflib.ufl.edu).

CHAPTER 2
EXAMPLE TABLE FORMATTING

2.1 Table Examples

The UF Graduate Counsel is very specific in the Table Requirements.There should be no vertical lines in tables and only three horizontal lines. Tables should be left aligned or the full width of the margins. No bold text, etc., see the web site for the complete list of requirements. One simple improvement can be incorporated by using tabularx instead of the tabular environment. This allows a table to be stretched the full text width easily, which avoids the centered or left aligned issue. Table 2-3 is an example of the tabularx code.

Table 2-1. A sample Table using tabularx. All tables should be left aligned OR the full width of the margin, like this one.

First	Second	Third
12	45	26
17	32	93
text	51	can be there too.

Praesent fermentum felis nec massa interdum, vel dapibus mi luctus. Cras id fringilla mauris. Ut molestie eros mi, ut hendrerit nulla tempor et. Pellentesque tortor quam, mattis a scelerisque nec, euismod et odio. Mauris rhoncus metus sit amet risus mattis, eu mattis sem interdum.

2.2 Additional Table Examples

Augue sapien mattis leo, nec accumsan turpis quam at neque. Ut pellentesque velit sed placerat cursus. Integer congue urna non massa dictum, a pellentesque arcu accumsan. Nulla posuere, elit accumsan eleifend elementum, ipsum massa tristique metus, in ornare neque nisl sed odio. Nullam eget elementum nisi. Duis a consectetur erat, sit amet malesuada sapien. Aliquam nec sapien et leo sagittis porttitor at ut lacus. Vivamus vulputate elit vitae libero condimentum dictum. Nulla facilisi. Quisque non nibh et massa ullamcorper iaculis.

2.3 Additional Table Examples

You may notice that some tables get moved outside of where you placed them. This is because LaTeX is a little too helpful when it comes to placement of 'float' types. You can get

Table 2-2. A sample Table using standard tablular

First	Second	Third
12	45	26
17	32	93
text	51	can be there too.

Table 2-3. Another sample Table using standard tablular

First	Second	Third
12	45	26
17	32	93
text	51	can be there too.

around this by using the "H" parameter in the table environment, or the 'multiFigure' environment described in the "adding graphics section"; ie section 3.4

Table 2-4. Caption Location. You should also make a note that the caption command is placed after the table itself, which means the caption occurs after the table. The graduate school requires tables to have captions placed before the actual table data, so the caption command should be located before the table data. See the next table for an example.

Some	Data	Goes	Here
Some	Data	Goes	Here
Some	Data	Goes	Here
Some	Data	Goes	Here

Table 2-5. Notice that this caption is included above the table data, as per the graduate school requirements. Also note that the caption itself has a short version in the "List of Tables" which is achieved by using the optional argument of the caption command. See the file source code directly to see the example.Unfortunately, since we did not use the "H" parameter in the table environment, this table was placed after the next section heading, which is almost certainly not where an author would have wanted it.

Some	Data	Goes	Here
Some	Data	Goes	Here
Some	Data	Goes	Here
Some	Data	Goes	Here

2.4 Very Long Tables

There are two approaches to inputting very long tables. You can do it manually, or you can do it using the longtables package. Here we include an example of both. Table 2-6 is done

manually, whereas 2-7 is done using the longtables package. Whatever works for you is fine to use, and you can use both in one document.

Augue sapien mattis leo, nec accumsan turpis quam at neque. Ut pellentesque velit sed placerat cursus. Integer congue urna non massa dictum, a pellentesque arcu accumsan. Nulla posuere, elit accumsan eleifend elementum, ipsum massa tristique metus, in ornare neque nisl sed odio. Nullam eget elementum nisi. Duis a consectetur erat, sit amet malesuada sapien. Aliquam nec sapien et leo sagittis porttitor at ut lacus. Vivamus vulputate elit vitae libero condimentum dictum. Nulla facilisi. Quisque non nibh et massa ullamcorper iaculis.Augue sapien mattis leo, nec accumsan turpis quam at neque. Ut pellentesque velit sed placerat cursus. Integer congue urna non massa dictum, a pellentesque arcu accumsan. Nulla posuere, elit accumsan eleifend elementum, ipsum massa tristique metus, in ornare neque nisl sed odio. Nullam eget elementum nisi. Duis a consectetur erat, sit amet malesuada sapien. Aliquam nec sapien et leo sagittis porttitor at ut lacus. Vivamus vulputate elit vitae libero condimentum dictum. Nulla facilisi. Quisque non nibh et massa ullamcorper iaculis.

Augue sapien mattis leo, nec accumsan turpis quam at neque. Ut pellentesque velit sed placerat cursus. Integer congue urna non massa dictum, a pellentesque arcu accumsan. Nulla posuere, elit accumsan eleifend elementum, ipsum massa tristique metus, in ornare neque nisl sed odio. Nullam eget elementum nisi. Duis a consectetur erat, sit amet malesuada sapien. Aliquam nec sapien et leo sagittis porttitor at ut lacus. Vivamus vulputate elit vitae libero condimentum dictum. Nulla facilisi. Quisque non nibh et massa ullamcorper iaculis.Augue sapien mattis leo, nec accumsan turpis quam at neque. Ut pellentesque velit sed placerat cursus. Integer congue urna non massa dictum, a pellentesque arcu accumsan. Nulla posuere, elit accumsan eleifend elementum, ipsum massa tristique metus, in ornare neque nisl sed odio. Nullam eget elementum nisi. Duis a consectetur erat, sit amet malesuada sapien. Aliquam nec sapien et leo sagittis porttitor at ut lacus.

Table 2-6. Feasible triples for highly variable Grid, MLMMH.

Time (s)	Triple chosen	Other feasible triples
0	(1, 11, 13725)	(1, 12, 10980), (1, 13, 8235), (2, 2, 0), (3, 1, 0)
2745	(1, 12, 10980)	(1, 13, 8235), (2, 2, 0), (2, 3, 0), (3, 1, 0)
5490	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
8235	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
10980	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
13725	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
16470	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
19215	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
21960	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
24705	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
27450	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
30195	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
32940	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
35685	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
38430	(1, 13, 10980)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
41175	(1, 12, 13725)	(1, 13, 10980), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
43920	(1, 13, 10980)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
46665	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
49410	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
52155	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
54900	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
57645	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
60390	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
63135	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
65880	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)

Table 2-6. Continued

Time (s)	Triple chosen	Other feasible triples
104310	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
107055	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
109800	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
112545	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
115290	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
118035	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
120780	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
123525	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
126270	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
129015	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
131760	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
134505	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
137250	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
139995	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
142740	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
145485	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
148230	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
150975	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
153720	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
156465	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
159210	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
161955	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
164700	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
169210	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
171955	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
184700	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
253720	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
256465	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
259210	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
261955	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
262955	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
263555	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
271955	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)

Alternatively, compared to the previous example where we used manual breaks to break the table, we can let LaTeX do this for us, as well as taking care of any recurrent headers and footers, utilizing the `\longtable` command,[1] as follows:

1 note that the longtable environment is not in a table environment; putting it inside a table environment will stop it from correctly page breaking as needed.

Table 2-7. Duplicate of Previous table, using longtables environment.

Time (s)	Triple chosen	Other feasible triples
0	(1, 11, 13725)	(1, 12, 10980), (1, 13, 8235), (2, 2, 0), (3, 1, 0)
2745	(1, 12, 10980)	(1, 13, 8235), (2, 2, 0), (2, 3, 0), (3, 1, 0)
5490	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
8235	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
10980	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
13725	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
16470	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
19215	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
21960	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
24705	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
27450	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
30195	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
32940	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
35685	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
38430	(1, 13, 10980)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
41175	(1, 12, 13725)	(1, 13, 10980), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
43920	(1, 13, 10980)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
46665	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
49410	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
52155	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
54900	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
57645	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
60390	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
63135	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
65880	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
68625	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
71370	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
74115	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
76860	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
79605	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
82350	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
85095	(1, 12, 13725)	(1, 13, 10980), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
87840	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
90585	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
93330	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
96075	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
98820	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
101565	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
104310	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
107055	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
109800	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
112545	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)

Table 2-17. Continued

Time (s)	Triple chosen	Other feasible triples
115290	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
118035	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
120780	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
123525	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
126270	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
129015	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
131760	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
134505	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
137250	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
139995	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
142740	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
145485	(1, 12, 16470)	(1, 13, 13725), (2, 2, 2745), (2, 3, 0), (3, 1, 0)
148230	(2, 2, 2745)	(2, 3, 0), (3, 1, 0)
150975	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
153720	(1, 12, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
156465	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
159210	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
161955	(1, 13, 16470)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)
164700	(1, 13, 13725)	(2, 2, 2745), (2, 3, 0), (3, 1, 0)

2.5 Tables with Notes

As there is no cell shading or other descriptive visuals in a table, you prefer to use tables notes to explain additional information. Below is an example of a table made with the 'threeparttable' environemnt.

Table 2-8. Here is my table that needs notes for further content information.

Some	Data	Goes	Here
Some	Data	Goes	Here
Some	Data	Goes	Here
Some	Data	Goes	Here

[1] Here is my table note.

CHAPTER 3
EXAMPLE FIGURE FORMATTING

3.1 Section Heading

Fusce eget tempus lectus, non porttitor tellus. Aliquam molestie sed urna quis convallis. Aenean nibh eros, aliquam non eros in, tempus lacinia justo. [1] In magna sapien, blandit a faucibus ac, scelerisque nec purus. Praesent fermentum felis nec massa interdum, vel dapibus mi luctus. Cras id fringilla mauris. Ut molestie eros mi, ut hendrerit nulla tempor et. Pellentesque tortor quam, mattis a scelerisque nec, euismod et odio. Mauris rhoncus metus sit amet risus mattis, eu mattis sem interdum.

3.1.1 Subsection Heading

Fusce eget tempus lectus, non porttitor tellus. Aliquam molestie sed urna quis convallis. Aenean nibh eros, aliquam non eros in, tempus lacinia justo. In magna sapien, blandit a faucibus ac, scelerisque nec purus. Praesent fermentum felis nec massa interdum, vel dapibus mi luctus. Cras id fringilla mauris. Ut molestie eros mi, ut hendrerit nulla tempor et. [3]

3.1.2 Subsection Heading

Fusce eget tempus lectus, non porttitor tellus. Aliquam molestie sed urna quis convallis. Aenean nibh eros, aliquam non eros in, tempus lacinia justo. In magna sapien, blandit a faucibus ac, scelerisque nec purus. Praesent fermentum felis nec massa interdum, vel dapibus mi luctus. Cras id fringilla mauris. Ut molestie eros mi, ut hendrerit nulla tempor et. [3]

3.2 Section Heading

Nec accumsan turpis quam at neque. Ut pellentesque velit sed placerat cursus. Integer congue urna non massa dictum, a pellentesque arcu accumsan. Nulla posuere, elit accumsan eleifend elementum, ipsum massa tristique metus, in ornare neque nisl sed odio. Nullam eget elementum nisi. Duis a consectetur erat, sit amet malesuada sapien. Aliquam nec sapien et leo sagittis porttitor at ut lacus. Vivamus vulputate elit vitae libero condimentum dictum. Nulla facilisi. Quisque non nibh et massa ullamcorper iaculis. A random citation to demonstrate the bibliography; [2].

3.3 Algorithm Example

Below is an example of an algorithm using algpseudocode. You can see how using a normal algorithm forces it into an object.

Require: $n \geq 0$
Ensure: $y = x^n$
  $y \leftarrow 1$
  $X \leftarrow x$
  $N \leftarrow n$
  while $N \neq 0$ **do**
    if N is even **then**
      $X \leftarrow X \times X$
      $N \leftarrow \frac{N}{2}$
    else if N is odd **then**
      $y \leftarrow y \times X$
      $N \leftarrow N - 1$
    end if
  end while

Object 3-1. This is the same algorithm with caption, taken from Overleaf, to show the use of the counterwithin command at the beginning of this chapter.

3.4 Examples of Adding Graphics

All of the below code with subfigures A-Z was generated with:

```
\begin{multiFigure}

\addFigure{0.3}{./theworld.png}

\addFigure{0.2}{./theworld.png}

\addFigure{0.4}{./theworld.png}

\addFigure[Z]{0.6}{./theworld.png}

\captionof{figure}[This is a test caption.]{This is a test caption.

This text has the bit for the whole figure.

Meanwhile, subfigure A is weird looking map.

Subfigure B is a smaller map.

And Subfigure C is a bigger but still weird looking map.

Moreover, I can override the map, which is why Z is
```

```
another weird map that came after map C.}
\end{multiFigure}
```

Note that LaTeX can be pretty fickle when it comes to placing figures relative to text near the figure. Specifically, the "Figure" environment is a 'float' type, which is placed somewhere "nearby" where it appears in the text, which can be pretty frustrating. For this reason I have circumvented the 'float' part of the figure in order to allow more control over the figure placement. So if one uses the `\begin{figure}\end{figure}` construction, the figure may appear in a slightly weird place, whereas you can use the `\begin{multiFigure}\end{multiFigure}` even with only 1 figure, to force placement to work. The only caveat here is that captions need to be placed using the command `\captionof{<NAME>}[<LIST-ENTRY>]{<CAPTION>}` where NAME is the type of caption, LIST-ENTRY is what appears in the 'List of' at the beginning of the thesis, and CAPTION is the actual caption.

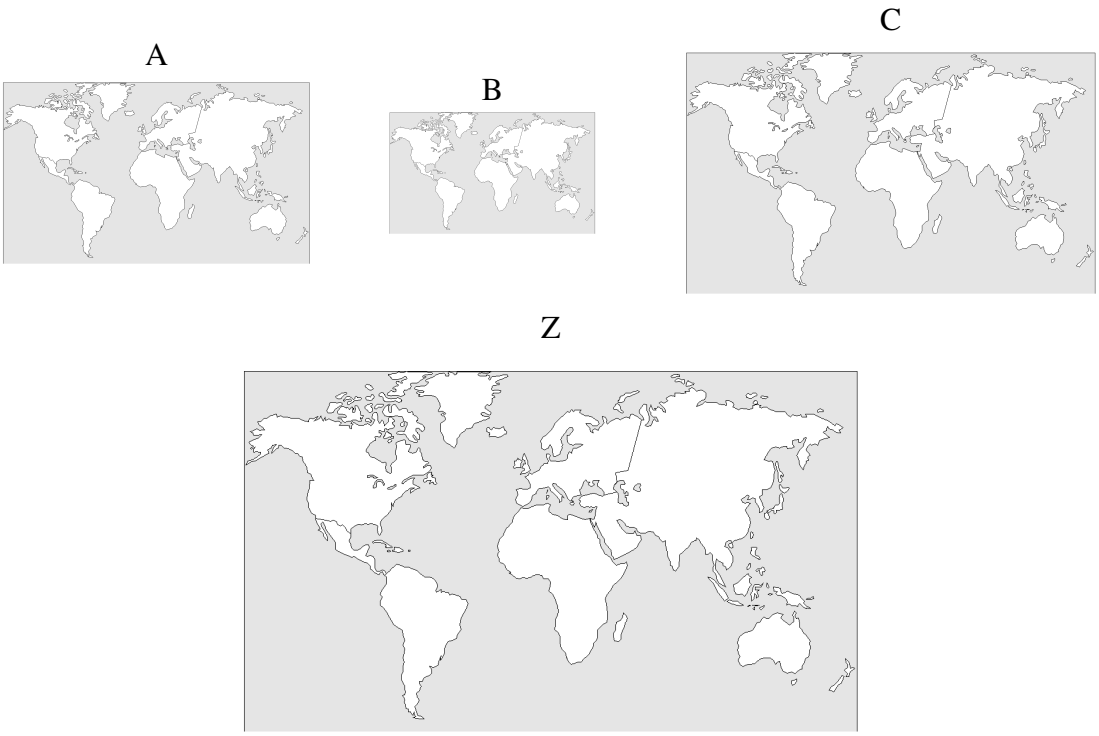

Figure 3-1. This is a test caption. This text has the bit for the whole figure. Meanwhile, A) is weird looking map. B) is a smaller map. And C) is a bigger but still weird looking map. Moreover, I can override the map, which is why Z is another weird map that came after map C.

3.5 A Note on Graphics

The command `\addFigure` in the multiFigure environment, and/or the command `\includegraphics` will take almost every type of graphic file currently in use as of the writing of this template. The only notable exception is the bitmap, ie .bmp file. Most software won't save to bitmap without specifically requesting it at this point, but if you have generated a .bmp file you can load it in most any graphic editor (eg MSpaint or photoshop) and save it as a different file type, such as .PNG which is significantly smaller file size as well.

Note that the commands typically require the file extension to be included, and it is case sensitive. Thus in the above `\addFigure{0.2}{./theworld.png}` works but `\addFigure{0.2}{./theworld.PNG}` would error and `\addFigure{0.2}{./theworld}` may or may not work depending on which specific TeX editor you are using.

3.6 Placement Specifiers

Floats are used to allow LaTeX to handle figures while maintaining the best possible presentation. However, there may be times when you disagree, and a typical example is with its positioning of figures. The placement specifier parameter exists as a compromise, and its purpose is to give the author a greater degree of control over where certain floats are placed. As you can see in Figure 3-2A this is a shark. As you can see in 2-6 this is a something.

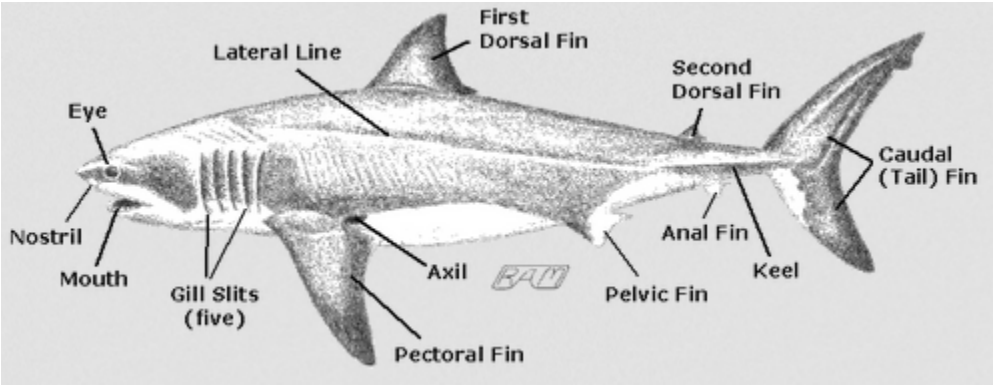

Figure 3-2. This is another figure as an example. Please note that the Editorial Office does not allow borders around figures. Used with permission from Martin, R. Aidan. 2003.

Table 3-1. Specifier Table

Specifier	Permission
h	Place the float here, i.e., approximately at the same point it occurs in the source text (however, not exactly at the spot)
t	Position at the top of the page.
b	Position at the bottom of the page.
p	Put on a special page for floats only.
!	Override internal parameters LaTeX uses for determining ”good” float positions.
H	Places the float at precisely the location in the LaTeX code.

CHAPTER 4
EXAMPLES OF EDITOR/AUTHOR TOOLS

If you don't see any blue or red type under this line, then you almost certainly need to include the optional "editMode" to the document class. Thus your document class (first line) should read `\documentclass[editMode]{ufdissertation}`

Test! This is a remark written by the author, to themselves, for review purposes. It will be suppressed unless editMode is used in the class options.

This is an editor's remark, written by an editor in-line so that they can write into the content itself with something easy to see. But the remark will be suppressed unless editMode is used in the class options.

To get this remark to go away, simply remove "editMode" from the documentclass options at the top of the user's tex-file. This also removes the blue Author Remarks.

CHAPTER 5
SUMMARY AND CONCLUSIONS

5.1 Section Heading

Aliquam molestie sed urna quis convallis. Aenean nibh eros, aliquam non eros in, tempus lacinia justo. In magna sapien, blandit a faucibus ac, scelerisque nec purus. Praesent fermentum felis nec massa interdum, vel dapibus mi luctus. Cras id fringilla mauris. Ut molestie eros mi, ut hendrerit nulla tempor et. Pellentesque tortor quam, mattis a scelerisque nec, euismod et odio. Mauris rhoncus metus sit amet risus mattis, eu mattis sem interdum.

5.1.1 Subsection Heading

Semper vel lorem eu, venenatis ultrices est. Nam aliquet ut erat ac scelerisque. Maecenas ut molestie mi. Phasellus ipsum magna, sollicitudin eu ipsum quis, imperdiet cursus turpis. Etiam pretium enim a fermentum accumsan. Morbi vel vehicula enim.

5.1.2 Subsection Heading

Semper vel lorem eu, venenatis ultrices est. Nam aliquet ut erat ac scelerisque. Maecenas ut molestie mi. Phasellus ipsum magna, sollicitudin eu ipsum quis, imperdiet cursus turpis. Etiam pretium enim a fermentum accumsan. Morbi vel vehicula enim.

5.1.2.1 Subsubsection heading

Placerat cursus. Integer congue urna non massa dictum, a pellentesque arcu accumsan. Nulla posuere, elit accumsan eleifend elementum, ipsum massa tristique metus, in ornare neque nisl sed odio. Nullam eget elementum nisi. Duis a consectetur erat, sit amet malesuada sapien. Aliquam nec sapien et leo sagittis porttitor at ut lacus. Vivamus vulputate elit vitae libero condimentum dictum. Nulla facilisi. Quisque non nibh et massa ullamcorper iaculis.[4]

5.1.2.2 Subsubsection heading

Placerat cursus. Integer congue urna non massa dictum, a pellentesque arcu accumsan. Nulla posuere, elit accumsan eleifend elementum, ipsum massa tristique metus, in ornare neque nisl sed odio. Nullam eget elementum nisi. Duis a consectetur erat, sit amet malesuada sapien. Aliquam nec sapien et leo sagittis porttitor at ut lacus. Vivamus vulputate elit vitae libero condimentum dictum. Nulla facilisi. Quisque non nibh et massa ullamcorper iaculis.[4]

5.2 Section Heading

Aliquam molestie sed urna quis convallis. Aenean nibh eros, aliquam non eros in, tempus lacinia justo. In magna sapien, blandit a faucibus ac, scelerisque nec purus. Praesent fermentum felis nec massa interdum, vel dapibus mi luctus. Cras id fringilla mauris. Ut molestie eros mi, ut hendrerit nulla tempor et. Pellentesque tortor quam, mattis a scelerisque nec, euismod et odio. Mauris rhoncus metus sit amet risus mattis, eu mattis sem interdum.

APPENDIX A
SOME ADDITIONAL MATERIAL

Test for first appendix file. Please note that if you are adding a table or figure that takes up a whole page, you must have some text underneath your appendix title before using the next page.

Table A-1. Aliquam mi nisi, tristique at rhoncus quis, consectetur non mi. Phasellus blandit quam ligula, a viverra lacus commodo at.

Some	Data	Goes	Here
Some	Data	Goes	Here
Some	Data	Goes	Here
Some	Data	Goes	Here

APPENDIX B
SECONDARY APPENDIX CONTENT

Paragraph headings. There is no official fourth level heading. Do not use the Paragraph heading feature in LaTeX, simply apply the bold characteristic to the first few words of a paragraph followed by a colon or period.

Additionally, the rules regarding italics and bolding does not apply to appendices. You can do whatever you'd like here mostly.

APPENDIX C
EXPERT OPINIONS

Test for third appendix file.

LIST OF REFERENCES

[1] Filippo Bracci, Manuel D. Contreras, and S. Diaz-Madrigal, *Evolution Families and the Loewner Equation II: complex hyperbolic manifolds*, arXiv e-prints (2008), arXiv:0807.1715.

[2] J.B. Conway, *Functions of One Complex Variable I*, Functions of one complex variable / John B. Conway, Springer, 1978.

[3] Walter Rudin, *Function theory in the unit ball of* $\mathbb{C}^n$, Springer-Verlag New York, 1980 (English).

[4] _____, *Real and Complex Analysis, 3rd ed.*, McGraw-Hill, Inc., New York, NY, USA, 1987.

BIOGRAPHICAL SKETCH

- Nmae plus Research interests
- PhD at UF
- UConn – BS + Goldwater Scholar
- Proof trading