

# Project 2 Requirements

## Abstract

The objectives, requirements, and relevant information for Project 2 are stated here. Submission of your files is done through the course website.

## 1 Purpose

The purpose of this project is for you to demonstrate the following:

**Capabilities:** Basic functional programming skills as evidenced by:

- Code solutions to Exercises 4.6.3, 4.6.4, 5.3.4, 5.3.5, and 6.2.1
- Session transcripts showing execution results of required test cases
- Explanations as required by each problem
- All source code for each exercise in the appendix

**Use of Relevant Tools and Techniques:** L<sup>A</sup>T<sub>E</sub>X, AUCTeX, emacs, and ML

**Deliverables and Evidence:** a pdf of your report with *all source files allowing others to reproduce your report, functional programs, and test results.*

## 2 Project Requirements

Your report shall have the content as illustrated by *Sample Report for Simple ML Example*. Your report will have the following content, in addition to the Title, Author, Date, Abstract, Acknowledgments, Table of Contents, and report chapters and sections covering:

**Chapter 1: Executive Summary** stating either

1. All requirements are satisfied with a summary of what was done, or
2. Some requirements are not satisfied due to incorrect or incomplete results, with a summary of what is satisfied, what is incomplete, and/or what is incorrect.

**Chapter 2: Exercise 4.6.3** with the following sections

- 2.1 Problem Statement
- 2.2 Relevant Code
- 2.3 Test Cases
- 2.4 Execution Transcripts

**Chapter 3: Exercise 4.6.4** with the following sections

- 3.1 Problem Statement
- 3.2 Relevant Code
- 3.3 Test Cases

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**Chapter 4: Exercise 5.3.4** with the following sections

- 4.1 Problem Statement
- 4.2 Relevant Code
- 4.3 Test Cases
- 4.4 Execution Transcripts

**Chapter 5: Exercise 5.3.5** with the following sections

- 5.1 Problem Statement
- 5.2 Relevant Code
- 5.3 Test Cases
- 5.4 Execution Transcripts

**Chapter 6: Exercise 6.2.1** with the following sections

- 6.1 Problem Statement
- 6.2 Relevant Code
- 6.3 Test Cases

**Appendix A: Exercise 4.6.3 Source Code**

Source code is input to the report using `\lstinputlisting`.

**Appendix B: Exercise 4.6.4 Source Code**

Source code is input to the report using `\lstinputlisting`.

**Appendix C: Exercise 5.3.4 Source Code**

Source code is input to the report using `\lstinputlisting`.

**Appendix D: Exercise 5.3.5 Source Code**

Source code is input to the report using `\lstinputlisting`.

**Appendix E: Exercise 6.2.1 Source Code**

Source code is input to the report using `\lstinputlisting`.

## 3 Relevant Information

### 3.1 Specific Tests

**Exercise 4.6.3** Use the tests in `ex-4-6-3Tests.sml`

**Exercise 4.6.4** Use the tests in `ex-4-6-4Tests.sml`

**Exercise 5.3.4** Use the tests in `ex-5-3-4Tests.sml`

**Exercise 5.3.5** Use the tests in `ex-5-3-5Tests.sml`

**Exercise 6.2.1** Test cases. **Make sure you turn off unicode and turn on types for your sessions/transcripts!**

1. Enter the HOL equivalent of  $P(x) \supset Q(y)$ . Show what HOL returns. What are the types of  $x$ ,  $y$ ,  $P$ , and  $Q$ ?
2. Consider again  $P(x) \supset Q(y)$ . Suppose we wish to constrain  $x$  to HOL type `:num` and  $y$  to HOL type `:bool`. Re-enter your expression corresponding to  $P(x) \supset Q(y)$  and show that the types of  $x$ ,  $y$ ,  $P$ , and  $Q$  are appropriately typed.

3. Enter the HOL equivalent of  $\forall x y. P(x) \supset Q(y)$ , without explicitly specifying types. What do you get and why?
4. Enter the HOL equivalent of  $\exists(x : \text{num}). R(x : \alpha)$ . What happens and why?
5. Enter the HOL equivalent of  $\neg\forall x. P(x) \vee Q(x) = \exists x. \neg P(x) \wedge \neg Q(x)$
6. Enter the HOL equivalent of the English sentence, *All people are mortal*, where  $P(x)$  represents *x is a person* and  $M(x)$  represents *x is mortal*.
7. Enter the HOL equivalent of the English sentence, *Some people are funny*, where  $\text{Funny}(x)$  denotes *x is funny*.

### 3.2 Submission Guidelines

**Deadline:** check course website

**Content & format:** zipped file of your Project 2 sub-directory containing a pdf of your report and all source files allowing complete reproduction of your report

**How submitted:** through course website

**Other information:** you will be allowed an unlimited number of attempts to submit your files up to the deadline. Your grade is based on the last submission.

### 3.3 Grading Criteria

Deliverable Item	Problem Statement	Relevant Code	Tests	Code in Appendix	Total
Chapter 1: Executive Summary	4 points for summary	N/A	N/A	N/A	4 points max
Chapter 2: 4.6.3 (a)–(f)	1	6	6	1	14 points max
Chapter 3: 4.6.4	1	1	1	1	4 points max
Chapter 4: 5.3.4	1	1	1	1	4 points max
Chapter 5: 5.3.5	1	1	1	1	4 points max
Chapter 6: 6.2.1 (1)–(7)	1	7	7	1	16 points max
Appendices A–E	N/A	5	N/A	N/A	5 points max
Subtotal	9 points max	21 points max	16 points max	5 points max	51 points max
Folder with all necessary components to reproduce report and all ML results					51 points max
<b>TOTAL</b>					102 points max