Prep Work 12 - Computability

CS 234

due April 21, before class

0 Introduction

This assignment has 1 part: computability.

This assignment is to be completed individually, but feel free to collaborate according to the course's external collaboration policy (which can be found in the syllabus).

The deliverables consist of one `.pdf` file. The deliverables should be submitted electronically by the deadline. Put any attribution text in the `.pdf` file.

Every file should be named like `FLast_cs234_pX.ext` where `F` is your first initial, `Last` is your last name, `X` is the assignment number, and `ext` is the appropriate file extension. For example, Alan Turing's `.pdf` file should be given the name `ATuring_cs234_p12.pdf`. (Alan Turing was the inventor of the Turing machine, and this work is considered to have started the field of computer science. Turing's advisor, Alonzo Church, also advised Stephen Cole Kleene (of the Kleene star), who in turn advised Robert Constable, who in turn advised me when I was an undergrad.)

1 Computability

Read chapter 14.1-14.6 in the textbook. Then complete the following tasks in your `.pdf` submission. Clearly label your responses with the task number.

1. In your own words, what is the Church-Turing thesis?
2. Can your computer accept any languages that a Turing machine cannot?
3. In your own words, what is the Universal Turing machine?
4. In your own words, give an intuitive idea of how the Universal Turing machine works.
5. In your own words, what is the definition of a recursive language?
6. Are recursive languages closed under complement? Why or why not?
7. In your own words, what is the definition of a recursively enumerable language?
8. In your own words, give an intuitive idea of how the proof of Theorem 14.2 works.
9. In your own words, give an intuitive idea of how the proof of Theorem 14.3 works.