CSCI 538—Computability

Lecture 1

Textbook: Introduction to Theory of Computation by Mike Sipser

0. About CS538

- Course home page: http://www.cs.montana.edu/bhz/classes/spring-2024/csci538
 D2L is only used for submitting assignments and projects, and for me to post solutions for assignments and tests.
- We will cover computability theory, NP-completeness, and some computational complexity topics.
- Evaluation: 2 in-class tests (40%), 4 assignments (40%) and project (20%)
- **Project**: Each student picks a research paper (related to algorithms and complexity), studies it and presents it to the class (with sufficient details, possibly with implementations, though not required). The previous year's projects are posted on the course webpage to give you some hints.
- While using web materials is fine, you MUST perform all the work by yourself and give the corresponding references.
- In learning the materials, if you solve an open problem or contribute to generate important new knowledge, you will get an A by default.

1. Overview

- Basic concepts (for those who did not take CSCI 338—read Chapter 0 ASAP)
- Turing machines, decidability/undecidability, **primitive recursive functions**
- Time complexity, NP, NP-completeness, intractable problems, *Turing reducibility*
- Computational complexity topics, space complexity, zero-knowledge proofs
- Approximation algorithms and inapproximability. FPT algorithms and intractability