St. Francis Xavier University
Department of Computer Science

CSCI 356: Theory of Computing
Midterm Examination Review
Fall 2026

1 Topics Covered

The following list gives an overview of every topic covered in CSCI 356 up to the midterm examination. You should ensure you have a good understanding of each topic. All midterm examination questions will test some topic on this list, but not all topics will be tested on the midterm examination.

- **Regular Languages**
  - Regex and regular expressions
    - Symbols, words, languages
    - Regular operations
    - Empty words and languages
    - Language of a regular expression
    - Operational order of precedence
  - Regular languages
  - Finite automata
    - Computations
    - Accepting computations
    - Language of a finite automaton
    - Nondeterminism
    - Epsilon transitions
  - Equivalence of models
    - Epsilon closure: ϵ–NFA = NFA
    - Determinization: NFA = DFA
    - State elimination: DFA $\to$ RE
    - McNaughton–Yamada–Thompson: RE $\to$ DFA
  - Kleene's theorem
  - Closure properties
    - Union
    - Concatenation
    - Kleene star
    - Complement
    - Intersection
  - Pumping lemma for regular languages
- **Context-Free Languages**
  - Context-free grammars
    - Language of a grammar
  - Context-free languages
  - Parse trees
  - Ambiguity and inherent ambiguity
  - Normal forms of grammars
    - Chomsky normal form

2 Format

The midterm examination is fifty minutes long. It consists of 4 questions worth a total of 25 marks.

The first question is divided into 5 multiple-choice style questions. The second, third, and fourth questions are short-answer style questions.

3 Tips and Tricks

- Double-check the date, time, and room of the midterm examination. You will not get extra time to write if you arrive late.
- Use your time wisely. Short answer questions will likely take more time than multiple choice questions, so make sure you allocate an appropriate amount of time for each question. As a rule of thumb, plan for 2 minutes per multiple choice question, 10 minutes per short answer question, and 10 minutes at the end to review your answers.
- Use the resources you are given. The TOCOpen textbook contains all of the material you need to know. The assignment questions are similar in content to the midterm examination questions, and Sipser's textbook contains many more practice questions.
- The practice midterm examination is very similar to the examination you will be writing. Compared to the assignment questions, the difficulty of the midterm examination questions will be appropriate for the length of time you have to write.
- Don't leave your questions until the last minute. Seek help before the midterm examination if you have questions. Attend office hours, make a post in the Moodle course forum, or send an email.
- Don't try to memorize concepts. Instead, focus on understanding the reasoning behind why a concept is true, and how the concept is applied.
- Don't panic!