

# CSCE 341 - F24: Final Exam Study Guide

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## Learning Goals

This is an outline of the things you have learned so far. Problems on the exam will reference these, showing why these problems were selected to test your knowledge. I do not guarantee that this outline is complete.

1. Regular Languages
  - (a) DFAs
  - (b) NFAs
  - (c) Regular Expressions
  - (d) Closure Properties
  - (e) Pumping Lemma
2. Context-Free Languages
  - (a) Context-Free Grammars
  - (b) Chomsky Normal Form
  - (c) Pushdown Automata
  - (d) Pumping Lemma
  - (e) Closure Properties
3. Turing Machines
  - (a) Implementation-level descriptions
  - (b) Modified Turing Machines
  - (c) Church-Turing Thesis
  - (d) Converting problems to decision problems, Encoding
  - (e) Decidability of DFAs
  - (f) Decidability of CFLs
  - (g) Many-One Reductions
  - (h) Undecidability
  - (i) Unrecognizability
4. Complexity
  - (a) Definition of Turing Machine complexity
  - (b) Complexity of Modified Turing Machines
  - (c) Complexity Classes P, NP
  - (d) Verifiers
  - (e) NP-Completeness, NP-Hardness
  - (f) Polynomial-Time Reductions
  - (g) Cook-Levin Theorem (Undecidability of *SAT*)