
Name:

CSC 416/565: Design and Construction of Compilers

West Chester University

Fall 2023

Midterm Questions

October 31, 2023

You have 75 minutes for this learning exercise.

Take your time.

It is out of 100 points.

There are three general types of questions: *easy* difficulty, *medium*, and *hard*. (Well, supposedly easy.) If you get stuck on a question, do not panic, it may be a difficult question.

A hand written, double sided, 8.5" x 11" cheat sheet is allowed.

1. Short answer questions: from a few words to a few sentences.
2. Write a regular expression to represent the following language: ...
3. The language of the regular expression ... is equivalent to the language of which of the following regular expressions:
4. For each of the following regular expressions, determine which, if any, of the strings match it:
5. Given the following lexical specification and alphabet ... which of the below strings will be successfully tokenized? If so, what is its tokenization?
6. Explain in informal English what this finite-state automata recognizes.
7. Construct a DFA for the following regular expression. Do it in two steps: first construct the NFA using Thompson's construction, then convert the NFA to a DFA. Let the alphabet be
8. Write a grammar that describes a number of *a*'s (zero or more) followed by ...
9. For the following grammar, determine which of the following strings are in the language of the grammar.
10. Eliminate the direct left recursion in the following grammar:
11. Left factor the following grammar:

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12. Consider the following grammar and input string:
- (a) Draw the parse tree that is produced.
 - (b) Show a leftmost derivation using the grammar.
 - (c) Show a rightmost derivation using the grammar.
13. Use the predictive parsing algorithm on the following LL(1) parsing table, grammar, and input string. Perform only the next three actions. At each step: show the stack, input string, and describe the performed action.
14. Construct the FIRST and FOLLOW sets for each nonterminal in the grammar. Then construct the LL(1) parsing table. Is the grammar LL(1)?
15. And 1 or 2 surprise questions! ☺

CSC 565 ONLY:

16. Use the predictive parsing algorithm on the following LR(1) parsing table, grammar, and input string. Perform only the next three shift/reduce actions. At each step: show the stack, input string, and describe the performed action.