CPSC 421/501 101 2020W Final Exam, Part 2

[redacted]

TOTAL POINTS

14 / 28

QUESTION 1

1 Question 1 4 / 8

- **0 pts** Correct
- **2 pts** Part a incorrect
- **2 pts** Part b incorrect

✓ **- 2 pts** **Part c incorrect (you need a specific example, such as the language of words whose 6th-last character is a 1; the general principle about reducing an NFA to a DFA doesn't help here).**

✓ **- 2 pts** **Part d incorrect**

- **1 pts** Part a partially correct
- **1 pts** Part b partially correct
- **1 pts** Part c partially correct
- **1 pts** Part d partially correct (The idea of diagonalization does not give a bijection per se, but some variant might; there is a simpler way.)

QUESTION 2

2 Question 2 10 / 10

✓ **- 0 pts** **Correct**

- **1.5 pts** Partially Correct application of the Mayhill-Nerode theorem
- **2 pts** Partially Correct DFA (e.g., one incorrect edge).
- **2 pts** Incomplete Explanation (Just restates $$\delta$$)
- **2.5 pts** Myhill-Nerode shows 5 states; DFA has 5 states.
- **3 pts** Non-existent explanation for how the DFA works.
- **1 pts** Incomplete/insufficient explanation for DFA.
- **3.5 pts** Incorrect DFA
- **5 pts** No DFA or explanation of one
- **5.5 pts** MyHill-Nerode solution indicates six states; DFA has 6 states.
- **1 pts** No indication of the accepting state
- **5 pts** No application of the Mayhill-Nerode theorem

QUESTION 3

3 Question 3 0 / 10

- **0 pts** Correct

✓ **- 10 pts** **No valid argument to show that L unrecognizable (5 points) or undecidable (5 points).**

- **5 pts** No valid argument to show that L is unrecognizable.
- **4 pts** The complement of L is not A_TM.
- **4 pts** The L you wrote on the page is not the L given on the exam (which is the set of <M> such that M accepts none of its inputs).
- **0.25 pts** The complement of L is the set of strings that either (1) are no descriptions of Turing machines, or (2) descriptions of Turing machines that accept at least one of its inputs.
- **0.5 pts** Description of why L^comp is recognizable is not quite correct: you need to do something like phases where M is simulated for i steps on the first i inputs in lexicographical order. HOWEVER, YOU DID CITE THE HOMEWORK AND REALIZED THE CONNECTION...
- **2.5 pts** Description of why L^comp is recognizable is not quite correct: you need to do something like phases where M is simulated for i steps on the first i inputs in lexicographical order.
- **1 pts** Justify why the "language of TM descriptions that accept at least 1 input" is recognizable.
- **1 pts** Cite the homework for both unrecognizability and undecidability while providing justification.
- **2 pts** Nearly correct use of a decider for L in the argument for undecidability. For instance, forgets to make Mw reject if the input is not w.

- 5 pts No valid argument to show that L is undecidable..

- The decider H is not a decider for L, it does not take inputs of the form <M,w> but rather inputs of the form <M>, hence the argument for undecidability is incorrect.2kk