CSC236FinalReview

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1 Question1

Description:combination of structural and simple induction(similar to the midterm)
Reference: Week2,3
Key:
1. Figure out what is your induction on? (See your predicate)
e.g: If your predicate is P(n), n is natural number, you should use simple(complete) induction.
If your predicate is $P(\alpha)$, α is a well-ordering structure, you should use structural induction.
2. Apply the template of the induction you use.

2 Question2

Description: Straightforward Structural Induction on a language(on a word)
Reference: Week3
Key:
1. See the structural definition of the language(word)
2. Apply Structural Induction Template

3 Question3

Description:find closed form solution of a recurrence. prove that it is correct
Reference: Week4,handout5
Key:
1.How to find closed form?
unwinding:
characteristic equation:
2.How to prove it is correct?
Complete Induction
3*. When should we use master theorem? To find the upper and lower bound(tight

bound)

Always remember that master theorem cannot give you a exact closed form.

4*. How to prove tight bound without using master theorem?

Use complete induction for special case, then prove general case. see A2

4 Question4

Description:Divide and conquer(similar to midterm). WC complexity

Reference: Week4,handout5

Key:

1.DC, please practice the recursion skill in CSC148

one example: closest pair of points

2.WC Complexity:

Write down the $T(n)$ function, apply master theorem. If you are not allowed using master theorem, please prove it formally. See above

5 Question5

Description: Correctness(Iterative) 3 sub questions:pre/post condition,loop invariant, Termination

Reference: Review Package, Week6, Week8

Key: (See test2 review package for more detail)

1. Pre condition: should be useful for proving loop invariant.

2. Loop invariant: should be useful for proving post condition. Proof by Simple Induction on times the loop iterates

6 Question6

Description: Given language, draw NFA that accepts this language. find equivalent DFA(subset construction)

Reference: Handout 9-11, subset construction.

Key:

1.How to draw NFA?

contain substring:

starts/end with:

2.Subset Construction: Please remember the algorithm

7 Question7

Description: a) transform a state diagram into RE. b)Prove a language is not regular

Reference: Handout 9-11, state removal. Key:

a) You can do it by state removal or by intuition. Always try to understand what the language this state diagram represent.

b) Pumping lemma: apply template.

8 Question8

Description: Similar to A3 Q8

Reference: Assignment3 Q8, Past final solution, Handout 9-11

Key:

1. This one might be the most difficult one.

2. See assignment3 Q8, consider 13L.

3*. http://courses.cms.caltech.edu/cs20/a/hw/hw2/solution/sol2.pdf for more informtion.

9 Other

1.Complete Induction and its template.

2.WOP

3.Recursive Program Correctness

4.Regex to NFA