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CS 320

Homework 1

Problem 1:

1a. a(a|b)*a with alphabet Σ = {a, b}

Answer: 'a' followed by some combination of 'a' and/or 'b'(if any), followed by 'a'.

1b. $((\varepsilon \mid a)\ b*)*$ with alphabet Σ = {a, b}

Answer: 'ε' or 'a' followed by some number of 'b', repeating(if any).

1c. $(a \mid b) * a\ (a \mid b)\ (a \mid b)$ with alphabet Σ = {a, b}

Answer: Some combination of 'a' or 'b', followed by 'a', followed by 'a' or 'b', followed by 'a' or 'b'.

1d. $a * b\ a * b\ a * b\ a *$ with alphabet Σ = {a, b}

Answer: Some number of 'a's' followed by 'b', followed by some number of 'a's', followed by 'b' followed by some number of 'a's', followed by 'b', concluded with some number of 'a's'.

1e. [2 – 9] | ([1 – 9][0 – 9]) | (1[0 – 9][0 – 9]) | 200

Answer: The string has 4 possible outcomes; 1. returning a number 2-9, 2. returning a number 10-99, 3. returning a number 100-199, and 4. returning 200.

Problem 2:

2a. Given alphabet Σ = {a, b, c, … , z} (i.e., lowercase letters), all strings that contain the five vowels in order. (Example string: aabdebcidou)

Answer: [a-z]*|[a*e*i*o*u*]

2b. Given alphabet Σ = {a, b, c, … , z} (i.e., lowercase letters), all strings in which the letters are in ascending lexicographic order. (Example string: aacgjpuxxyz)

Answer: a*b*c*....z*

2c. Given alphabet Σ = {a, b, c, … , z, A, B, C, … , Z, $*$, $/$} (i.e., lowercase letters, uppercase letters, symbol * and symbol /), comments that consist of a string surrounded by /* and */, without an intervening */. (Example string: /* add x and y */)

Answer: (\/)(*)([a-z]*|[A-Z]*|[" "]*)*(*)(\/)

2d. Given alphabet Σ = {a, b} (i.e., letters a and b), all strings that do not contain the subsequence abb. (Example string: aaa, ababab, bbbbbbab)

Answer: ^((?!abb).)*$

2e. Given alphabet Σ = {a, b} (i.e., letters a and b), all strings that has odd number of a. (Example string: a, bababbba, aaab)

Answer: (b*a(aa)*b)

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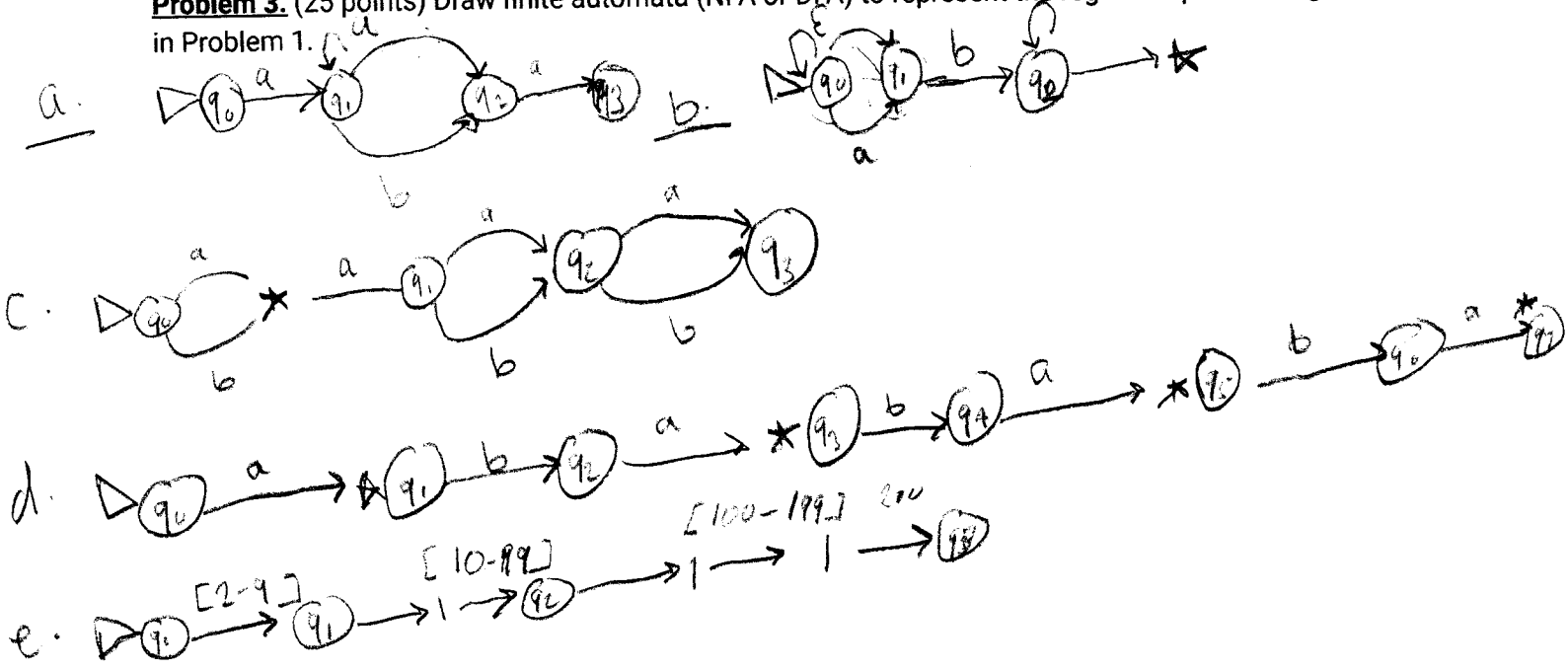
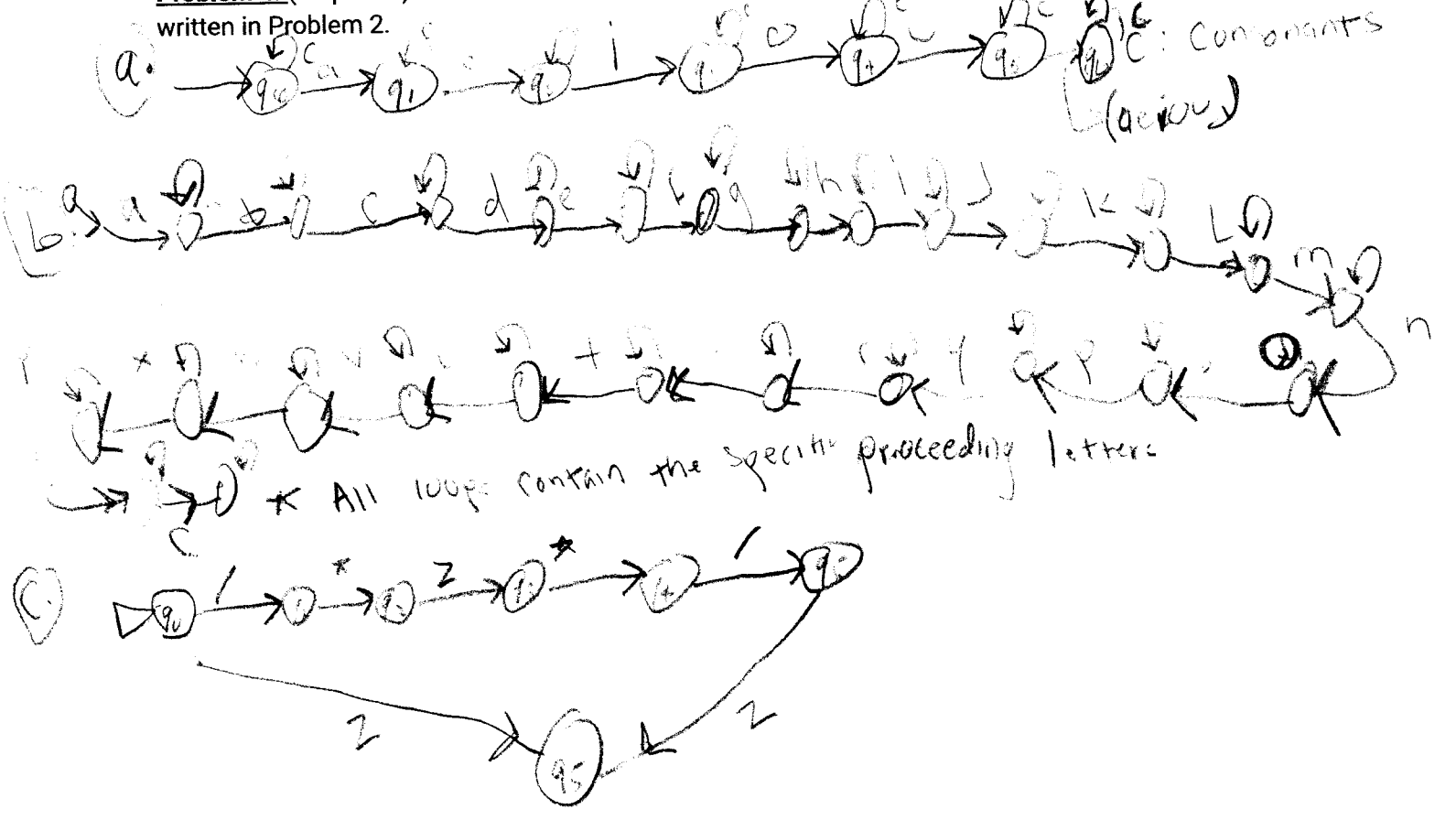
Problem 3. (25 points) Draw finite automata (NFA or DFA) to represent the regular expressions given in Problem 1.

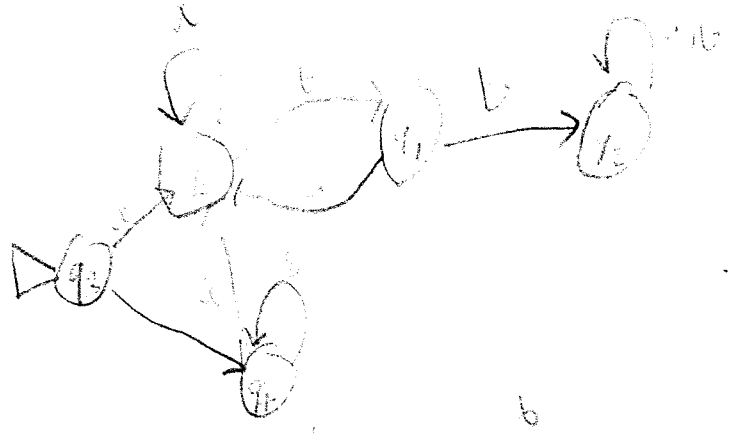


Problem 4. (25 points) Draw finite automata (NFA or DFA) to represent the regular expressions written in Problem 2.



* See back

4d.



4e.