INDIVIDUAL HOMEWORK 6, CPSC 421/501, FALL 2023

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Please note:

(1) You must justify all answers; no credit is given for a correct answer without justification.
(2) Proofs should be written out formally.
(3) Homework that is difficult to read may not be graded.
(4) You may work together on homework in groups of up to four, **but you must write up your own solutions individually and must acknowledge with whom you worked.** You must also acknowledge any sources you have used beyond the textbook and two articles on the class website.

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(1) Let L be the language of strings that represent non-negative even numbers in base 5 without leading 0's, i.e., $L \subset \Sigma^*_{\text{Five}} = \{0,1,2,3,4\}^*$,

$$L = \{0, 2, 4, 11, 13, 20, 22, \ldots\}$$

(for example, 123 in base 5 refers to $1 \times 5^2 + 2 \times 5^1 + 3 \times 5^0$, which in base 10 is 38, which is even; hence $123 \in L$).

(a) Describe an algorithm to determine which strings are in L; your description should be brief and not involve DFA's. Explain why your algorithm works.
(b) Give the formal description of a DFA that recoginizes L based on the algorithm in part (a), and briefly explain why your DFA implements this algorithm.

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