

Mid1 Summer 2022

Q1) A) Discuss the advantages and drawbacks of pointers in C.

Advantage(s):

Drawback(s):

B) Compare between Java and C in terms of; you must explain (justify) your answer.

1) Reliability

2) Readability

3) Cost of execution

4) Portability

Q2) Design a DFA to recognize each of the following languages

- 1) A language defined over the alphabet $\Sigma = \{0,1\}$ that contains only strings with length divisible by 3.
- 2) The set of all phone numbers in Saudi Arabia where the country code "00966" is optional. If the country code is missing then a leading 0 must exist. Example 00966583378880 is a valid phone number but since the country code is optional the same number can be written as 0566583378880 (notice the presence of a leading 0 in the second number).

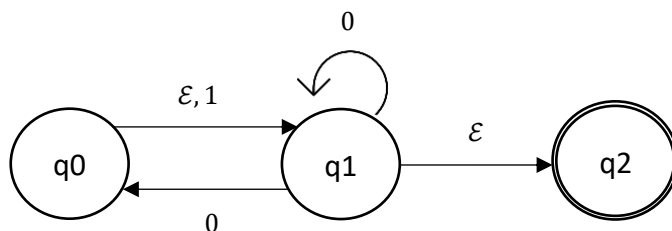
Q3) Write a regular expression describing each of the languages describe in the previous question

1-

2-

Q4) A) Convert the regular expression $(a^*b)^+(b^*a)$ into an NFA.

B) Consider the following NFA



- 1) Represent the NFA using a table

2) Give the shortest string that would be rejected by the above NFA.

3) Convert the above NFA into a DFA.

Q5) Consider the following CFG

$$A \rightarrow AA \mid (A) \mid a$$

1) Show that the grammar is ambiguous

2) Rewrite the grammar to eliminate ambiguity

3) Is the above language regular? Why or why not?