

2023 NCKU CSIE Compiler Quiz 1

1. (45 %) Write regular expressions for the following character sets, or give reasons why no regular expression can be written:
 - (a) (5 %) All strings of lowercase letters that begin and end in a.
 - (b) (5 %) All strings of lowercase letters that either begin or end in a (or both).
 - (c) (5 %) All strings of digits that contain no leading zeros.
 - (d) (5 %) All strings of digits that represent even numbers.
 - (e) (5 %) All strings of digits such that all the 2's occur before all the 9's.
 - (f) (5 %) All strings of a's and b's that contain no three consecutive b's.
 - (g) (5 %) All strings of a's and b's that contain an odd number of a's or an odd number of b's (or both).
 - (h) (5 %) All strings of a's and b's that contain an even number of a's and an even number of b's.
 - (i) (5 %) All strings of a's and b's that contain exactly as many a's and b's.
2. (25 %) Use Thompson's construction to convert the regular expression $(aa|b)^*(a|bb)^*$ into an NFA.
3. (30 %) Convert the NFA of part 2 into a DFA using the subset construction.

