

### Question 1

Let  $\Sigma = \{a, \dots, z\} \cup \{\#\}$ .

Construct an nfa that accepts the strings  $w \in \Sigma^*$  such that

- (a)  $w = w_1, \dots, w_n$ , where  $n \geq 1$  and for  $1 \leq i \leq n$ ,  $w_i \in \{taksim, sariyer, ve, -ler, -ki, -n, -de, -in, \#\}$ .
- (b) each  $w$  is a Turkish noun phrase with the following property: when you insert  $w$  into the slot '\_\_\_beni çok korkutuyor', you get a grammatical sentence, where  $w$  is understood as the subject of *korkutmak*, the entity or entities that frighten the speaker of the sentence. The sentence may be pragmatically deviant, though. E.g. an acceptable  $w$  would be *sariyerler#ve#taksiminki* or, say, *taksim#ve#taksim*.

Please remember that you are allowed to read strings in a single transition of your nfa.

#### Solution:

Below are some possible cases that fulfill ; it is enough to cover C1 to get full credit.

C1: No possessive *-in*, no modification, two conjuncts are independent.

C2: C1 + possessive *-in*.

C3: C1 + With modification, e.g. *taksimdeki sariyer*.

C4: C1 + the acceptability of the first conjunct depends on the second; e.g. *taksim in ve sariyerinkiler*, but not *taksim in ve sariyerdeki*.

C5: Any non-trivial (=with at least two of them) combination of C2–C4.

Nfa for C1:

