Tutorial #8

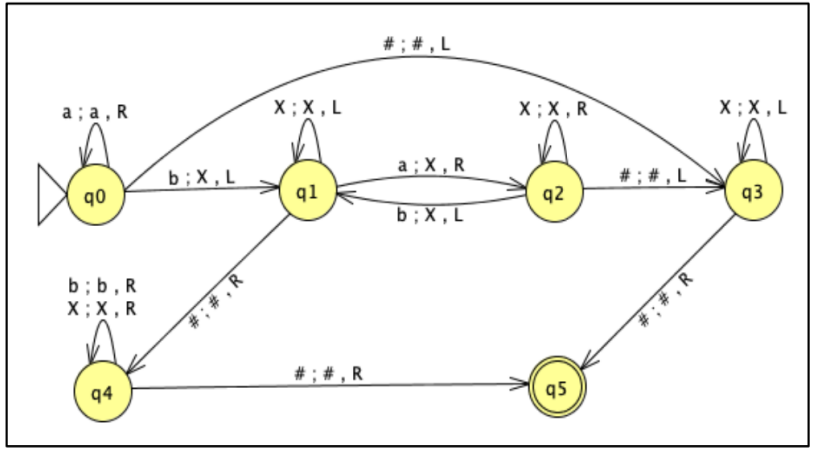
Exercise 1

- Accepted language
- The time complexity and its corresponding class
- The space complexity and its corresponding class

$L = \{a^i b^j \mid i \geq 0, j \geq i\}$,

time complexity: $O(n^2)$ → class P

space complexity: $O(n)$ → class PS



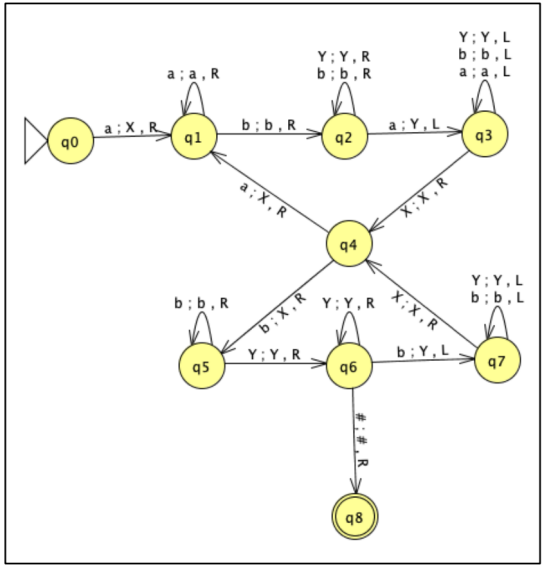
Exercise 1

- Accepted language
- The time complexity and its corresponding class
- The space complexity and its corresponding class

$$L = \{ a^i b^j a^i b^j \mid i > 0, j > 0 \}$$

time complexity: $O(n^2)$ → class P

space complexity: $O(n)$ → class PS



Exercise 2

Which of the following statements about the class P are correct?

- P is the class of all languages that are decidable by deterministic single-tape Turing machines running in polynomial time
- P is the class of all languages such that $w \in P$ then there is a deterministic single-tape Turing machine which accepts the string w in polynomial time.
- P is the class of all languages that are decidable by deterministic multi -tape Turing machines running in polynomial time
- A language L belongs to P if there is a constant k and a decider M running in time $O(n^k)$ such that $L = L(M)$
- A language L belongs to P if $L \in TIME(2^n)$

Exercise 2

Which of the following statements about the class P are correct?

- P is the class of all languages that are decidable by deterministic single-tape Turing machines running in polynomial time.➔ **Correct**
- P is the class of all languages such that $w \in P$ then there is a deterministic single-tape Turing machine which accepts the string w in polynomial time.➔**Incorrect**
- P is the class of all languages that are decidable by deterministic multi -tape Turing machines running in polynomial time.➔ **Correct**
- A language L belongs to P if there is a constant k and a decider M running in time $O(n^k)$ such that $L = L(M)$.➔**Correct**
- A language L belongs to P if $L \in TIME(2^n)$.➔ **Incorrect**

Exercise 3

Below are some definitions of the class $\mathcal{NP}$, Which ones are correct?

- $\mathcal{NP}$ is the class of languages which have polynomial time verifiers.
- $\mathcal{NP}$ is the class of languages that cannot be decided in polynomial time using a deterministic Turing machine.
- $\mathcal{NP}$ is the class of languages that have non-deterministic verifiers.
- $\mathcal{NP}$ is the class of languages that can be decided in polynomial time on a non-deterministic Turing machine.

Exercise 3

Below are some definitions of the class $\mathcal{NP}$, Which ones are correct?

- $\mathcal{NP}$ is the class of languages which have polynomial time verifiers. ➔ **Correct**
- $\mathcal{NP}$ is the class of languages that cannot be decided in polynomial time using a deterministic Turing
- machine. ➔ **Incorrect**
- $\mathcal{NP}$ is the class of languages that have non-deterministic verifiers. ➔ **Incorrect**
- $\mathcal{NP}$ is the class of languages that can be decided in polynomial time on a non-deterministic Turing
- machine. ➔ **Correct**