

## Assignment2

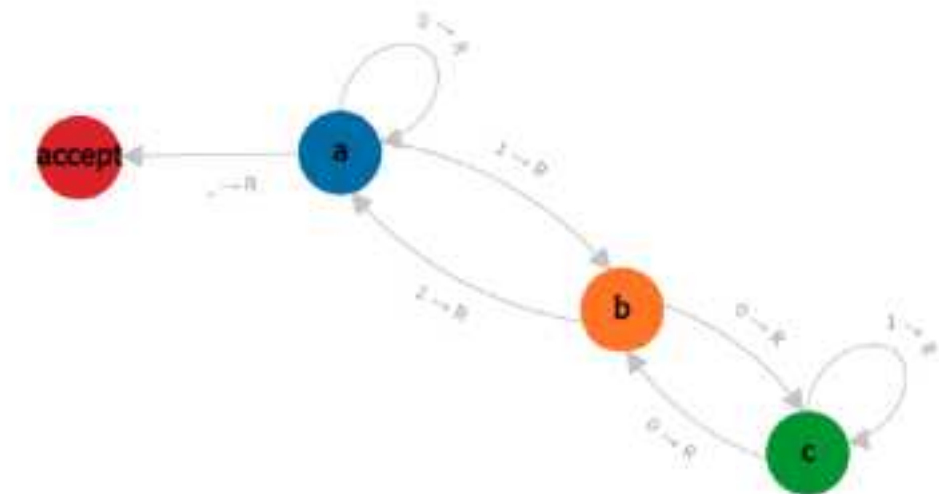
### 1. Short Answer Questions. (4pts)

- 1) What is the basic unit of TM model? Please briefly describe what each unit does. (2pts)
- 2) In single computation step, what needs to be done? (1pts)
- 3) How many possible result cases of a computation process of a TM? Please list them. (1pts)

### 2. True or False (2pts, 1pts per question)

- F a) If the computation process of the TM never halting, there are infinite states in its set of states Q.
- T b) Logic is the father/mother of Computer Science.

### 3. Consider Turing machine M1 with the following state diagram and answer the questions. (4pts)



Note: The reject state and the transitions going to the reject state are not shown in the state diagram. The transitions occur implicitly whenever a state lacks an outgoing transition for a particular symbol. For completeness, we say that the head moves right in each of these transitions to the reject state.

3.

1) accept state (1pts)

$$10101011 \cup q_{\text{accept}} \cup (10101011 \cup q_{\text{accept}}) \quad (1\text{pts})$$

2) reject state (1pts)

$$01010101 q_{\text{reject}} \cup (01010101 q_{\text{reject}}) \quad (1\text{pts})$$

1) If the start configuration is qa10101011, Turing machine M1 will enter \_\_\_\_\_. (accept state, reject state, never halting). If M1 enter accept state or reject state, what is the halting configuration? (2pts)

2) If the start configuration is qa01010101, Turing machine M1 will enter \_\_\_\_\_. (accept state, reject state, never halting). If M1 enter accept state or reject state, what is the halting configuration? (2pts)

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1.

1) Tape; Read/Write head; Control unit (1pts)

♣ **Tape**

- ◆ The TM model uses *an infinite tape* that is divided into *infinite cells*, each of which can contain any one of *a finite set of symbols*, as its unlimited memory.
- ◆ The type can be infinite at one end or infinite at both ends.

♣ **Read/Write head**

- ◆ The TM model has *a read/write head* that can **READ** and **WRITE** symbols and **MOVE** on the tape, its action is controlled by the control unit.

♣ **Control unit**

- ◆ The TM model has *a control unit* that controls actions performed by the read/write head.

(每一部分的用处简述合理即可, 1pts)

2) Each computation step consists of reading the symbol in the current tape cell, writing a symbol into that cell, and moving the head one cell to the left or right. (1pts)

3) Three

accept and halt; reject and halt; never halting (1pts)