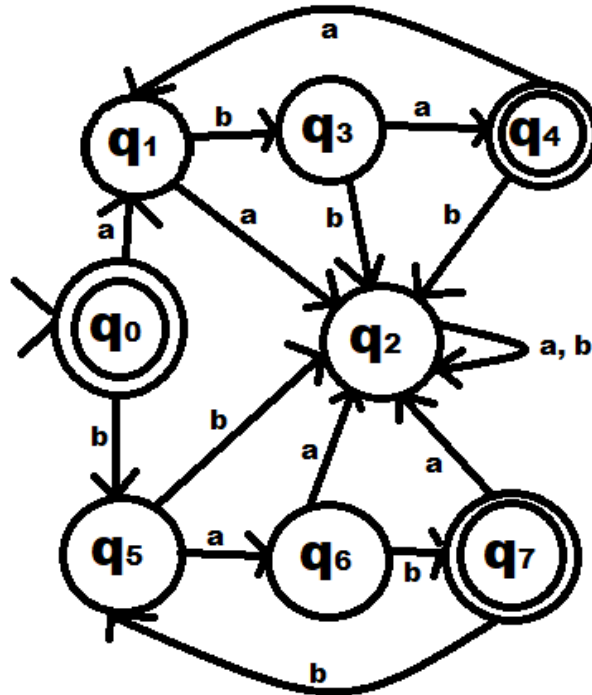


### CS332 Mod02 HW3

1. (10 pts) Let  $\Sigma = \{a, b\}$ . Draw the FSM,  $M$ , for  $L = (aba)^* + (bab)^*$



2. (6 pts) Represent  $M$  as the 5-tuple  $M = \{Q, \Sigma, q_0, F, \delta\}$ .

$$M = \{Q, \Sigma, q_0, F, \delta\}$$

$$Q = \{q_0, q_1, q_2, q_3, q_4, q_5, q_6, q_7\}$$

$$\Sigma = \{a, b\}$$

$$q_0 = q_0$$

$$F = \{q_0, q_4, q_7\}$$

$$\delta =$$

	a	b
0	1	5
1	2	3
2	2	2
3	4	2
4	1	2
5	6	2
6	2	7
7	2	5

3. (3 pts) List the states that are visited when the string  $u = \text{abaaba}$  is processed. Is the string accepted or rejected?

$u \rightarrow q_0, q_1, q_3, q_4, q_1, q_3, q_4$

The string is accepted.

4. (3 pts) List the state that are visited when the string  $v = \text{baba}$  is processed. Is the string accepted or rejected?

$v \rightarrow q_0, q_5, q_6, q_7, q_2$

The string is rejected.

5. (8 pts) There are four things wrong with the following 5-tuple for some machine,  $M$ . What are they?

$Q = \{ q_0, q_1, q_2, q_3, q_4, q_5 \}$

$\Sigma = \{a, b\}$

$q_0 = q_7$

$F = q_4$

$\delta =$

- $q_7$  doesn't exist in  $Q$  so the statement  $q_0 = q_7$  must be an error.
- $F = q_4$  is incorrect notation and should be  $F = \{ q_4 \}$
- $\delta(b, q_4) = \text{"n/a"}$  is not acceptable. It must produce an existing state. Every input must produce a valid output.
- $\delta(a, q_1) = \text{"0 or 1"}$  is not acceptable as that implies it is a non-deterministic situation. Every state must always have exactly ONE state for every possible input in the  $\Sigma$ .

	a	b
0	1	2
1	0 or 1	2
2	3	4
3	3	5
4	5	n/a
5	5	5