

Homework 4

November 4, 2022

1 Turing Machine M3

1.1 State transition Graph

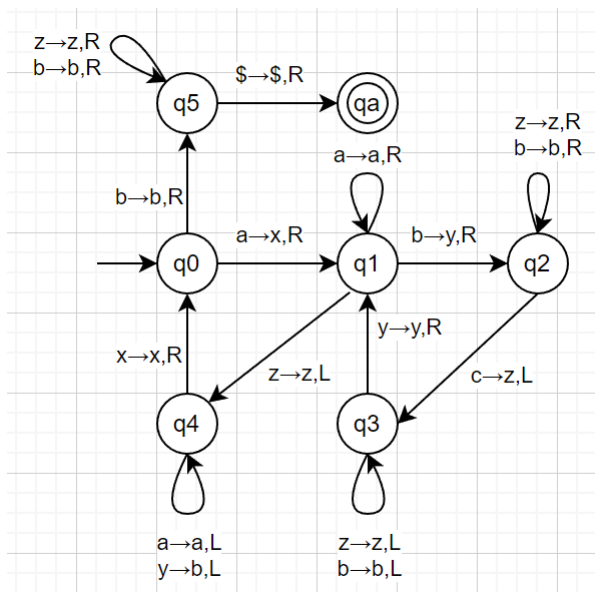


Figure 1: M3

where qa is the accept state, qr is the reject state, $q0$ is the initial state. If finally it cannot reach either qa or qr , then it would be rejected by default. $\$$ is the blank character appending behind the input string.

1.2 Example

- Accept instance:
input: *abbcc*

1	q0	qabbcc\$		12	q1	xyyqzz\$
2	q1	xqbbcc\$		13	q4	xyqyzz\$
3	q2	xyqbcc\$		14	q4	xqybzz\$
4	q2	xybqcc\$		15	q4	qxbbzz\$
5	q3	xyqbzc\$		16	q0	xqbbzz\$
6	q3	xqybzc\$		17	q5	xbqbzz\$
7	q1	xyqbzc\$		18	q5	xbbqzz\$
8	q2	xyyqzc\$		19	q5	xbbzqz\$
9	q2	xyyzqc\$		20	q5	xbzzqz\$
10	q3	xyyqzz\$		21	qa	xbzzz\$q
11	q3	xyqyzz\$				have accepted

- Reject instance:
input: *abcc*

1	q0	qabcc\$		7	q4	qxbzcc\$
2	q1	xqbcc\$		8	q0	xqbzcc\$
3	q2	xyqcc\$		9	q5	xbqzcc\$
4	q3	xyqzc\$		10	q5	xbzqcc\$
5	q1	xyqzc\$		11	qr	xbzccq\$
6	q4	xqyzc\$				have rejected

2 Turing Machine M4

2.1 State transition Graph

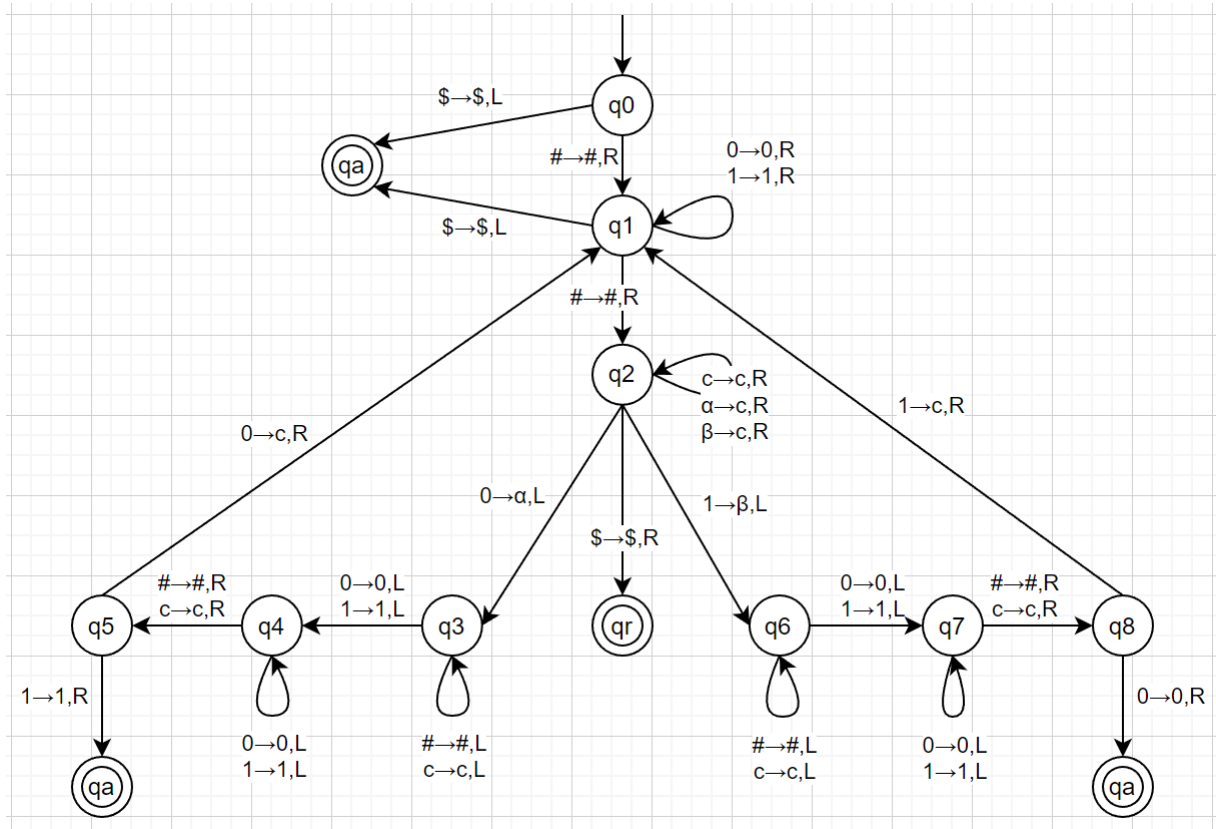


Figure 2: M4

where qa is the accept state, qr is the reject state, $q0$ is the initial state. If finally it cannot reach either qa or qr , then it would be rejected by default. $\$$ is the blank character appending behind the input string.

2.2 Example

- Accept instance:
input: #00#01

1	q0	q#00#01\$		12	q1	#c0q# α 1\$
2	q1	#q00#01\$		13	q2	#c0#q α 1\$
3	q1	#0q0#01\$		14	q2	#c0#cq1\$
4	q1	#00q#01\$		15	q6	#c0#qc β \$
5	q2	#00#q01\$		16	q6	#c0q#c β \$
6	q3	#00q# α 1\$		17	q6	#cq0#c β \$
7	q3	#0q0# α 1\$		18	q7	#qc0#c β \$
8	q4	#q00# α 1\$		19	q8	#cq0#c β \$
9	q4	q#00# α 1\$		20	qa	#c0q#c β \$
10	q5	#q00# α 1\$				have accepted
11	q1	#cq0# α 1\$				have accepted

- Reject instance:
input: #00#00

1	q0	q#00#00\$		14	q2	#c0#cq0\$
2	q1	#q00#00\$		15	q3	#c0#q α \$
3	q1	#0q0#00\$		16	q3	#c0q#c α \$
4	q1	#00q#00\$		17	q3	#cq0#c α \$
5	q2	#00#q00\$		18	q4	#qc0#c α \$
6	q3	#00q# α 0\$		19	q5	#cq0#c α \$
7	q3	#0q0# α 0\$		20	q1	#c0q#c α \$
8	q4	#q00# α 0\$		21	q2	#c0#q α \$
9	q4	q#00# α 0\$		22	q2	#c0#cq α \$
10	q5	#q00# α 0\$		23	q2	#c0#c α q\$
11	q1	#cq0# α 0\$		24	qr	#c0#c α \$q
12	q1	#c0q# α 0\$				have rejected
13	q2	#c0#q α 0\$				have rejected