CSCI-109-HW4

AI and Turing Machine

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1.1

This page contains a hand-drawn game tree for tic-tac-toe (noughts and crosses), showing various board states connected by arrows with annotations such as +1, -1, W=+1, L=-1, D=0.
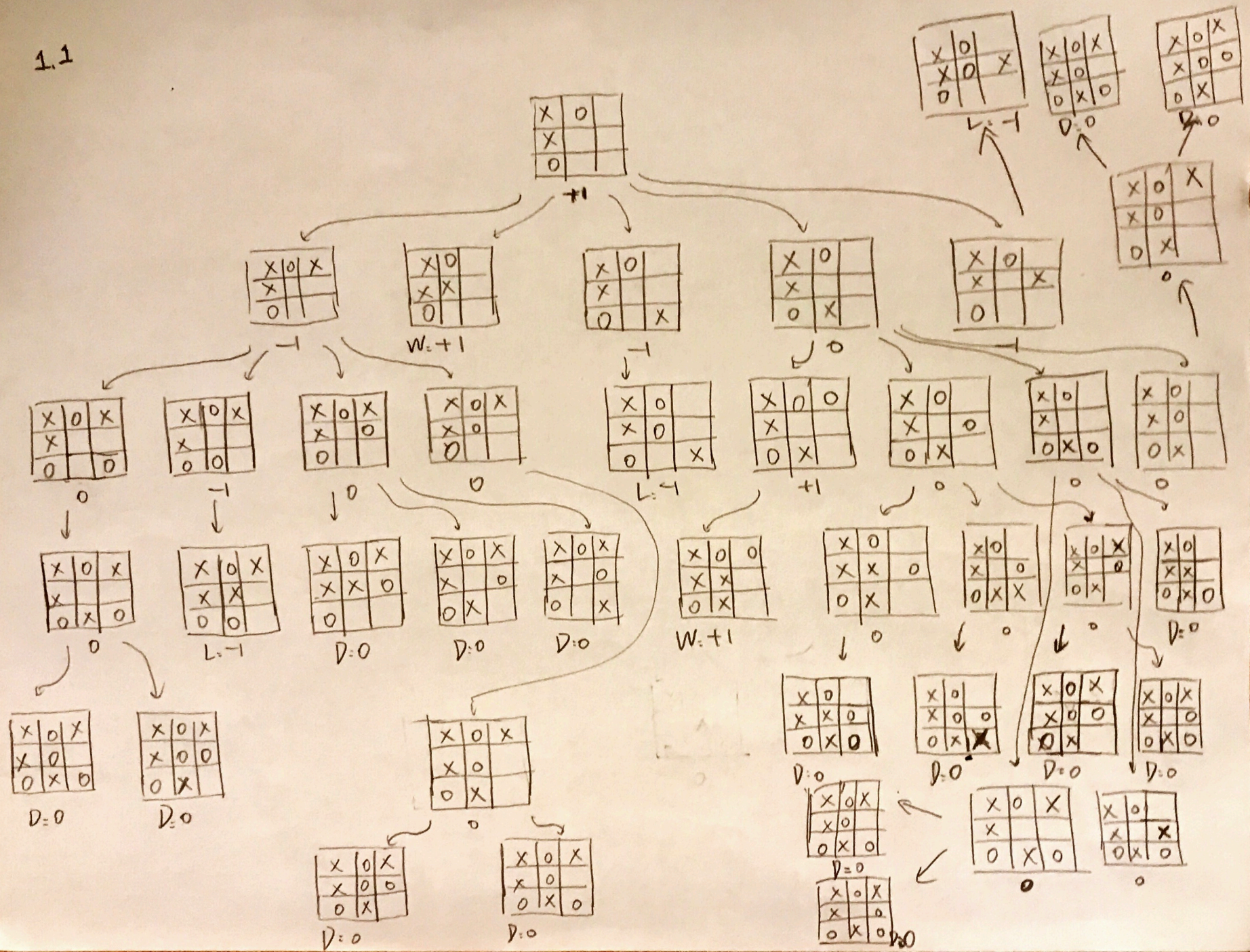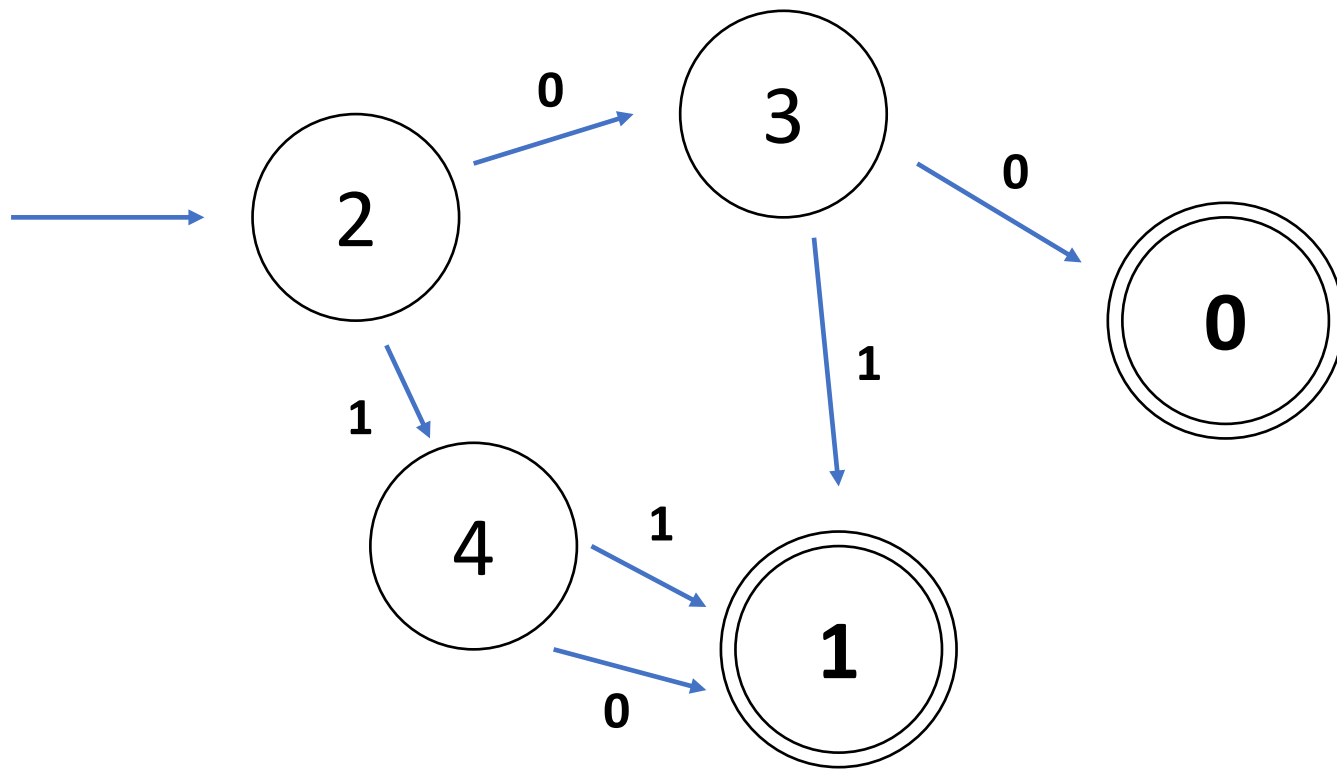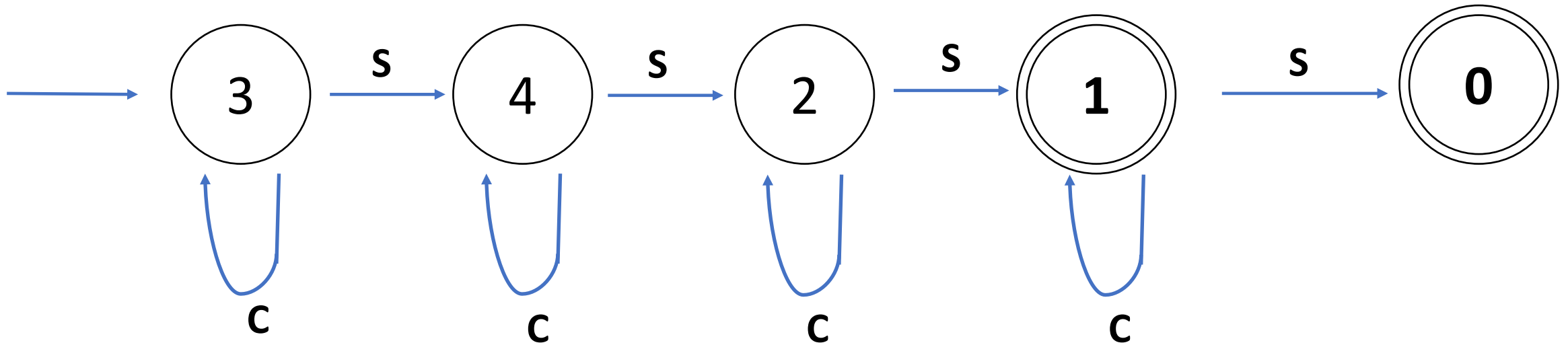
1.2

X	O	
X	X	
O		

is the winning strategy, because there is two pathways that would win, but the opponents could only stop one.
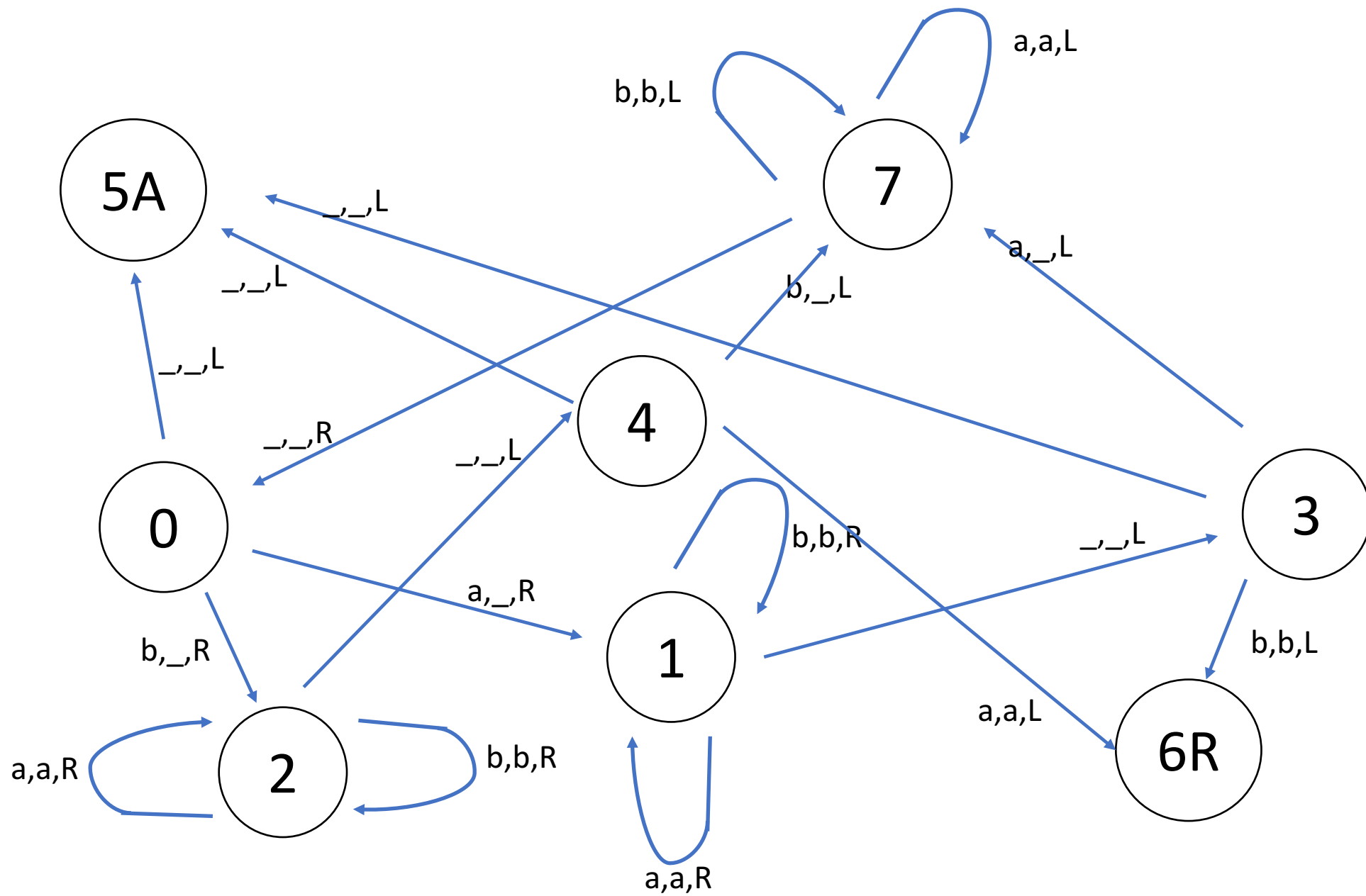
2.1

2.2

2.3

This finite state machine is impossible to achieve because this finite state machine would be infinite, which contradicts the definition of finite state machines.

3.1

3.2

Step	State			Tape				Transition	Note
1	0	*a	b	a	b	a		_,Right,1	Found an a. Write _, swtich to 1.
2	1		*b	a	b	a		b, Right, 1	Found an b. Write b, stay in 1
3	1		b	*a	b	a		a, Right, 1	Found an a. Write a, stay in 1
4	1		b	a	*b	a		b, Right, 1	Found an b. Write b, stay in 1
5	1		b	a	b	*a		a, Right, 1	Found an a. Write a, stay in 1
6	1		b	a	b	a	*	_, Left, 3	Found a _. Write _, swtich to 3
7	3		b	a	b	*a		_, Left, 7	Found an a. Write _, switch to 7
8	7		b	a	*b			b, Left, 7	Found an b. Write b, stay in 7
9	7		b	*a	b			a, Left, 7	Found an a. Write a, stay in 7
10	7		*b	a	b			b, Left, 7	Found an b. Write b, stay in 7
11	7	*	b	a	b			_, Right, 0	Found a _. Write _, switch to 0
12	0		*b	a	b			_, Right, 2	Found an b. Write_, switch to 2
13	2			*a	b			a, Right, 2	Found an a. Write a, stay in 2
14	2			a	*b			b, Right, 2	Found an b. Write b, stay in 2
15	2			a	b	*		_, Left, 4	Found an _. Write _, switch to 4
16	4			a	*b			_, Left, 7	Found an b. Write _, switch to 7
17	7			*a				a, Left, 7	Found an a. Write a, stay in 7
18	7		*	a				_, Right, 0	Found a _. Write _, switch to 0
19	0			*a				_, Right, 1	Found an a. Write _, switch to 1
20	1					*		_, Left, 3	Found a _. Write _, switch to 3
21	3				*			_, Left, 5	Found a _. Write _, switch to 5
22	5			*				Accept	

3.3

Step	State	Tape					Transition	Note
1	0		*a	b	b		_, Right, 1	Found an a. Write _, switch to 1.
2	1			*b	b		b, Right, 1	Found an b. Write b, stay in 1
3	1			b	*b		b, Right, 1	Found an b. Write b, stay in 1
4	1			b	b	*	_, Left, 3	Found a _. Write _, switch to 3
5	3			b	*b		b, Left, 6	Found an b. Write b, switch to 6
6	6			*b	b		Reject	

3.4

This Turing machine is processing strings of palindromes, so that it accepts palindrome strings, and it rejects non-palindrome strings.