

On my honor, I have not given, nor received, nor witnessed any unauthorized assistance on this work.

Print name and sign: _____

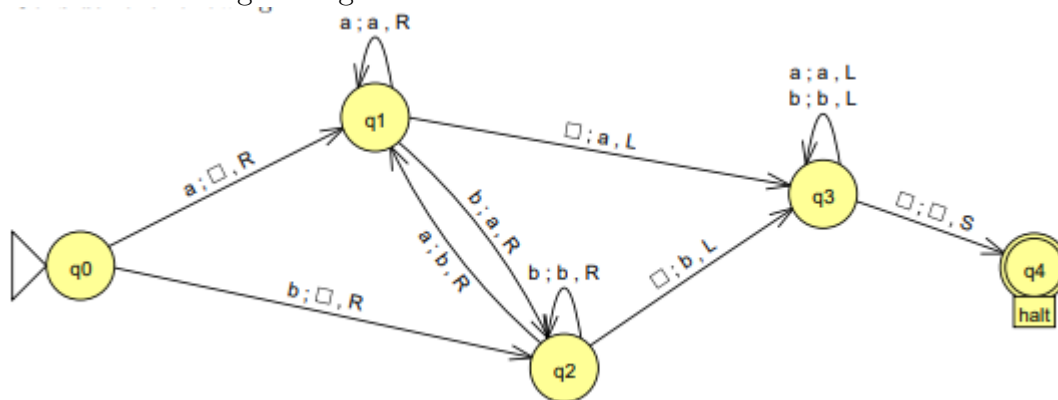
Question:	1	2	3	4	Total
Points:	10	13	4	3	30
Score:					

1. (10 points) Draw the machine described by the tuple:

$(\{q_0, q_1, q_2, q_3\}, \{0, 1\}, \Gamma, \delta, q_0, \{q_3\})$

	0	1	\square
δ : q0	(q1, \square , R)	(q1, \square , R)	(q3, \square , S)
q1	(q1, 0, R)	(q1, 1, R)	(q2, \square , L)
q2	(q2, \square , L)	(q2, \square , L)	(q3, \square , S)

2. Consider the following Turing Machine:

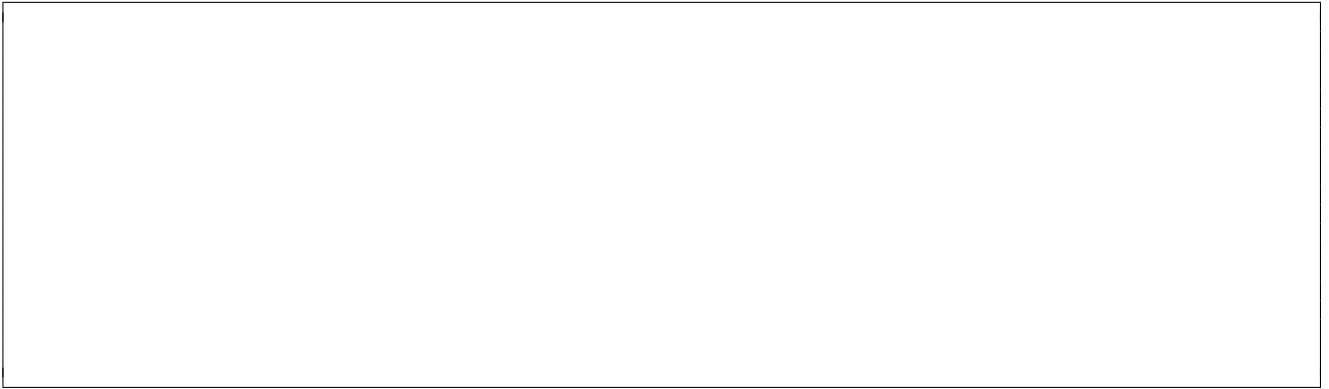


(a) (8 points) The tape contains:

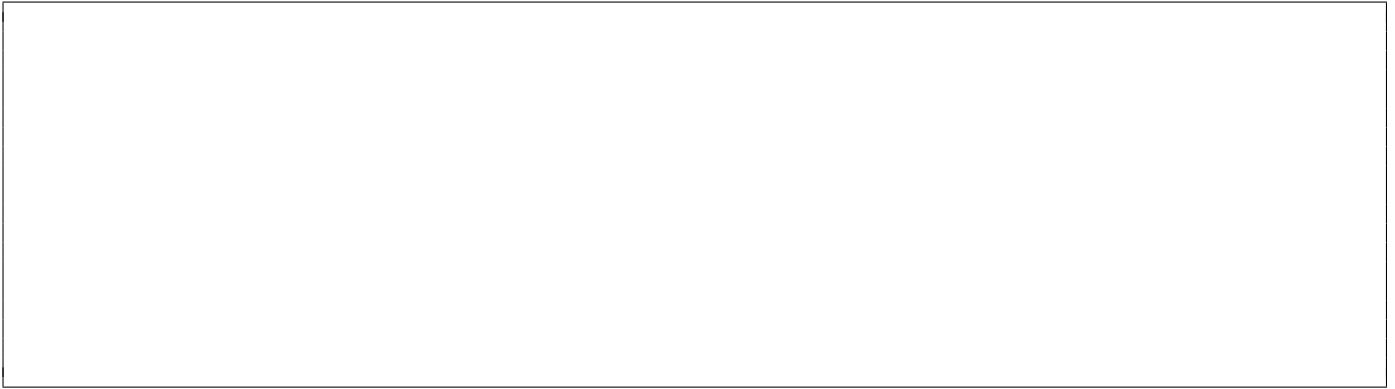
... | a | b | b | a | ...
 \wedge

and all other squares are blank and \wedge indicating the starting position of the machine's head. Give the final configuration of the machine when it halts. A configuration consists of two things: the state (eg. q_0 , q_1 , etc) and the symbols currently on the tape. *Hint, writing down a sequence of configurations is the way to earn partial credit on this problem.*

(b) (5 points) Give a concise English description of what this machine does for any input (not just the one given in the previous part).



3. (4 points) Design (draw) a Turing Machine which accepts the language defined by the regular expression $ab(a|b)^*$. It doesn't matter what is on the tape when the machine halts. *Hint: what is the shortest string we need to accept? Do we care about the rest of the string?*



4. (3 points) The Halting Problem is a classic problem in computer science. Concisely explain what the halting problem is. You do not need to give a formal explanation; a clear explanation in plain English is sufficient.

