gradiance

Zayd

• Home Page

• Assignments Due

• Progress Report

• Handouts

• Tutorials

• Homeworks

• Lab Projects

• Log Out

Help

Gradiance Online Accelerated Learning

Submission number:	82833
Submission certificate:	JA073087
Submission time:	2014-05-03 20:07:32 PST (GMT - 8:00)

Number of questions:	5
Positive points per question:	3.0
Negative points per question:	1.0
Your score:	15

based on Chapter 8 of HMU.

1. A nondeterministic Turing machine M with start state q_0 and accepting state q_f has the following transition function:

$\delta(q,a)$	0	1	B
q_0	$\{(q_1,0,R)\}$	$\{(q_1,0,R)\}$	$\{(q_1,0,R)\}$
q_1	$\{(q_1,1,R), (q_2,0,L)\}$	$\{(q_1,1,R), (q_2,1,L)\}$	$\{(q_1,1,R), (q_2,B,L)\}$
q_2	$\{(q_f,0,R)\}$	$\{(q_2,1,L)\}$	$\{\}$
q_f	$\{\}$	$\{\}$	$\{\}$

Simulate all sequences of 5 moves, starting from initial ID $q_0 1010$. Find, in the list below, one of the ID's reachable from the initial ID in EXACTLY 5 moves.

  a) $q_2 0110$

  b) $01q_2 10$

  c) $0111q_1$

  d) $0q_2 110$

Answer submitted: **d)**

You have answered the question correctly.

Question Explanation:

Here are all the possible sequences of ID's with up to 5 moves.

$q_0 1010 \vdash 0q_1 010 \vdash 01q_1 10 \vdash 011q_1 0 \vdash 0111q_1 \vdash 01111q_1$
$q_0 1010 \vdash 0q_1 010 \vdash 01q_1 10 \vdash 011q_1 0 \vdash 0111q_1 \vdash 011q_2 1$
$q_0 1010 \vdash 0q_1 010 \vdash 01q_1 10 \vdash 011q_1 0 \vdash 01q_2 10 \vdash 0q_2 110$
$q_0 1010 \vdash 0q_1 010 \vdash 01q_1 10 \vdash 0q_2 110 \vdash q_2 0110 \vdash 0q_f 110$
$q_0 1010 \vdash 0q_1 010 \vdash q_2 0010 \vdash 0q_f 010$

2. A Turing machine M with start state q_0 and accepting state q_f has the following transition function:

δ(q,a)	0	1	B
q₀	$(q_0,1,R)$	$(q_1,1,R)$	(q_f,B,R)
q₁	$(q_2,0,L)$	$(q_2,1,L)$	(q_2,B,L)
q₂	-	$(q_0,0,R)$	-
q_f	-	-	-

Deduce what M does on any input of 0's and 1's. Hint: consider what happens when M is started in state q_0 at the left end of a sequence of any number of 0's (including zero of them) and a 1. Demonstrate your understanding by identifying the true transition of M from the list below.

a) $q_0 0101 \mid$-* $1010q_f$

b) $q_0 1010 \mid$-* $1001Bq_f$

c) $q_0 0101 \mid$-* $0100Bq_f$

d) $q_0 1010 \mid$-* $0101Bq_f$

Answer submitted: **d)**

You have answered the question correctly.

Question Explanation:

M inverts all 0's and 1's on its input and then accepts. To see why, notice that for any string w, M makes the following sequence of transitions:

$(q_0,0...01w) \mid$-* $1...1q_0 1w \mid$- $1...11q_1 w \mid$- $1...1q_2 1w \mid$- $1...10q_0 w$

Also, started in state q_0 with only 0's to its right, M moves to the right, replacing the 0's by 1's, and accepts when it reaches a blank.

3. The Turing machine M has:

- States q and p; q is the start state.
- Tape symbols 0, 1, and B; 0 and 1 are input symbols, and B is the blank.
- The following next-move function:

State	Tape Symbol	Move
q	0	$(q,0,R)$
q	1	$(p,0,R)$
q	B	(q,B,R)
p	0	$(q,0,L)$
p	1	none (halt)
p	B	$(q,0,L)$

Simulate M on the input 1010110, and identify one of the ID's (instantaneous descriptions) of M from the list below.

a) 1p010110

b) 0000q110

c) 101q0110

d) 0000000qB

Answer submitted: **b)**

You have answered the question correctly.

Question Explanation:

Here is the complete sequence of ID's after which M halts: q1010110 |-
0p010110 |- q0010110 |- 0q010110 |- 00q10110 |- 000p0110 |- 00q00110 |-
000q0110 |- 0000q110 |- 00000p10

4. The Turing machine M has:

   - States q and p; q is the start state.
   - Tape symbols 0, 1, and B; 0 and 1 are input symbols, and B is the
     blank.
   - The following next-move function:

State	Tape Symbol	Move
q	0	(q,0,R)
q	1	(p,0,R)
q	B	(q,B,R)
p	0	(q,0,L)
p	1	none (halt)
p	B	(q,0,L)

   Your problem is to describe the property of an input string that makes M halt.
   Identify a string that makes M halt from the list below.

   a) 11010

   b) 0101

   c) 00100

   d) 010001

   Answer submitted: **a)**

   You have answered the question correctly.

   Question Explanation:

   In state q, as long as M sees only 0's, it leaves its tape unchanged and continues
   moving right. The only way M can halt is by being in state p and seeing a 1. The
   only way that M gets to state p is by being in state q and seeing a 1. Since in
   state q, M moves right when it sees the 1, we conclude that M will halt if it ever
   finds two consecutive 1's.

   We need to make sure that there are no other ways M could halt, say by seeing a
   single 1. However, if M enters state p, it will surely have 0 to its left, because it
   changes the 1 to a 0. If in state p, M sees 0 or B, it moves left, back to the 0 and
   enters state q again. At that point, M will proceed right, in state q, until it sees
   another 1.

5. A nondeterministic Turing machine M with start state q_0 and accepting state
   q_f has the following transition function:

$\delta(q,a)$	0	1	B
q_0	{(q_1,0,R)}	{(q_1,0,R)}	{(q_1,0,R)}

q_1	$\{(q_1,1,R), (q_2,0,L)\}$	$\{(q_1,1,R), (q_2,1,L)\}$	$\{(q_1,1,R), (q_2,B,L)\}$
q_2	$\{(q_f,0,R)\}$	$\{(q_2,1,L)\}$	$\{\}$
q_f	$\{\}$	$\{\}$	$\{\}$

Deduce what M does on any input of 0's and 1's. Demonstrate your understanding by identifying, from the list below, the ID that CANNOT be reached on some number of moves from the initial ID $q_0010101$.

 a) $01111111q_1$

 b) $0111q_2111111$

 c) $0q_f111111$

 d) $q_f0111111$

Answer submitted: **d)**

You have answered the question correctly.

Question Explanation:

M starts by replacing the first symbol by 0 and then enters state q_1, moving right. In state q_1, it moves right, changing all symbols, including blanks, to 1. However, at any time, it may also "guess" that it is time to enter q_2. In that branch, the symbol being scanned is left unchanged, and M moves left, over 1's, until it meets the initial 0. At that point, it moves right and enters state q_f.