Feedback — Week 5: Turing Machine

You submitted this homework on **Sat 24 Oct 2015 8:17 PM CEST**. You got a
score of **4.00** out of **4.00**.

Question 1

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.

Your Answer		Score	Explanation
○ 1001			
● 11010	✔	1.00	
○ 0010			
○ 001010			
Total		1.00 / 1.00	

Question 2

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.

Your Answer	Score	Explanation
○ 1p010110		
◉ 000p0110	✔ 1.00	
○ 000001q0		
○ 1q010110		
Total	1.00 / 1.00	

Question 3

A 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	$(q_0,1,R)$	$(q_1,1,R)$	(q_f,B,R)
q_1	$(q_2,0,L)$	$(q_2,1,L)$	(q_2,B,L)
q_2	-	$(q_0,0,R)$	-

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.

Your Answer	Score	Explanation
⦿ $q_0 0011$ |-* $1100Bq_f$	✔ 1.00	
○ $q_0 1010$ |-* $1001Bq_f$		
○ $q_0 0011$ |-* $1100q_f$		
○ $q_0 1010$ |-* $0101q_f$		
Total	1.00 / 1.00	

Question 4

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.

Your Answer	Score	Explanation
⦿ $01111q_1$	✔ 1.00	
○ $01q_2 10$		
○ $011q_2 11$		
○ $0q_2 111$		

Total	1.00 / 1.00