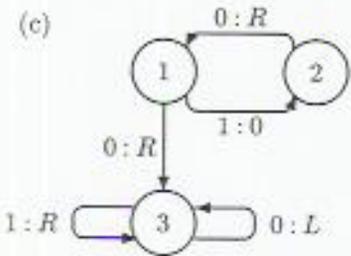
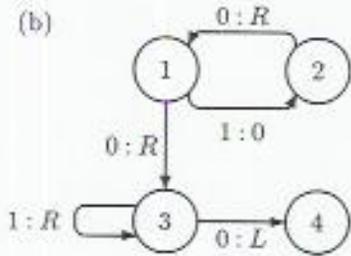
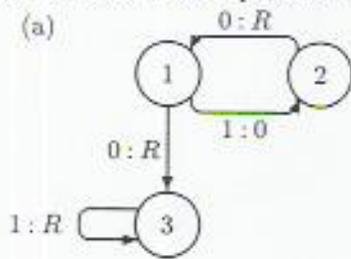


Question 6 (Unit 1) - 10 marks

- (i) We wish to design a Turing machine which, using monadic notation, inputs a pair  $(m, n)$  of positive integers in standard starting position (on an otherwise blank tape), and which halts scanning the rightmost of a string of  $n$  1s on an otherwise blank tape.

Write down which of the following Turing machines is suitable for this task. For each machine which is unsuitable, explain why it is unsuitable: this explanation can take the form of a sequence of configurations for appropriate test data.



[7]

- (ii) Devise and give the flow graph of a Turing machine which, using monadic notation, inputs a pair  $(m, n)$  of positive integers in standard position and which halts scanning a single 1 on an otherwise blank tape. (You may assume that the input  $(m, n)$  is also on an otherwise blank tape.)

[3]