

## Context-Sensitive Languages: Questions

1. Consider the following grammar with start symbol S:

S  $\rightarrow$  FM  
F  $\rightarrow$  FaA  
F  $\rightarrow$  FbB  
F  $\rightarrow$  aA  
F  $\rightarrow$  bB  
Aa  $\rightarrow$  aA  
Ab  $\rightarrow$  bA  
Ba  $\rightarrow$  aB  
Bb  $\rightarrow$  bB  
AM  $\rightarrow$  Ma  
BM  $\rightarrow$  Mb  
M  $\rightarrow$  c

Indicate whether or not the following strings belong to this language:

- a. c
- b. aca
- c. acb
- d. bcb
- e. abcab
- f. abcba
- g. bacba
- h. bacab
- i. aacaa
- j. aacb

2. Consider the linear bounded automaton with start state s and the following transitions:

((s,<),(t,<,R))  
((t,a),(u,x,R))  
((t,b),(v,x,R))  
((t,x),(t,x,Y))  
((t,>),(t,>,Y))  
((u,a),(u,a,R))  
((u,b),(u,b,R))  
((u,x),(w,x,L))  
((u,>),(w,>,L))  
((v,a),(v,a,R))  
((v,b),(v,b,R))  
((v,x),(x,x,L))  
((v,>),(x,>,L))  
((w,a),(y,x,L))  
((w,x),(w,x,Y))  
((x,b),(y,x,L))  
((x,x),(x,x,Y))  
((y,a),(y,a,L))  
((y,b),(y,b,L))  
((y,x),(t,x,R))

Indicate whether or not the following strings belong to this language:

- a. aa
- b. ab
- c. bb
- d. aba
- e. abba
- f. abab
- g. aaaa
- h. bbbb
- i. baab
- j. baba