CSE6339 3.0 Introduction to Computational Linguistics
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Markov Algorithms

Determine what the following Markov algorithm does and explain why it does not double a string. What change(s) would it take to make it double a string?

1.	ζ η β	→	η β ζ	ζ, η are members of the alphabet
2.	α ζ	→	ζ β ζ α	λ represents the null symbol
3.	β	→	λ	α, β are markers
4.	α	→	. λ	
5.	λ	→	α	

The algorithm

e.g., abc → αabc → aβaαbc → aβabβbαc → aβbβabαc → aβbβabcβcα → aβbβacβbcα → aβbβcβabcα → abβcβabcα → bβacβabcα → bβcβaabcα → bcβaabcα → bcaabcα → bcaabc

To double or duplicate the string use the following Markov algorithm

1: [prod. schema]	*f* δ β	→	δ β *f*	δ, *f* are members of the alphabet
2: [prod. schema]	§ *f*	→	*f* β *f* §	
3:	β	→	σ	
4:	σ	→	*W*	
5:	§	→	•*W*	
6:	*W*	→	§	

e.g., abc → (by 6) §abc → (by 2) aβa§bc → (by 3) aσa§bc → (by 2) aσabβb§c → (by 1) aσbβab§c → (by 2) aσbβabcβc§ → (by 1) aσbβacβbc§ → (by 1) aσbβcβabc§ → (by 3) aσbσcβabc§ → (by 3) aσbσcσabc§ → (by 4) abσcσabc§ → (by 4) abcσabc§ → (by 4) abcabc§ → (by 5) abcabc

Write a Markov algorithm to transform a binary number, e.g., "101" into a unary number represented as a series of tallies, e.g., "11111" that represents the binary number.

1.	| 0	→	0 | |	0, 1, | are members of the alphabet
2.	1	→	) |	λ is the null symbol
3.	0	→	λ	

input 101 → 0|01
00||1
00||0|
00|0|||
000|||||
00|||||
0|||||
|||||