

Theory of Computation, CSCI 438 spring 2022
No new readings, March 4

1. Fill out the two columns, telling if the language is regular/context-free, and how you would prove this.

	Language	The language is regular	The language is context free
1	$L = \{a^n b^n \mid n \geq 0\}$		
2	$L = \{a^i b^j \mid i < j\}$		
3	$L = \{a^i b^j \mid i \geq 0 \text{ and } j > 0\}$		
4	$L = \{a^n b^n c^n \mid n \geq 0\}$		
5	Language of all strings xyz where x, y and z are elements of $\{a,b\}^*$ and $z = x^r$		
6	Language consisting of all strings on $\{0,1\}^*$ with more 0's than 1's.		
7	$L = \{ww^rww^r\}$		
8	Language consisting of all strings of 0's and 1's where any 0 is followed by a 1.		
9	$L = \{a^n b^j \mid n = j^2\}$		
10	Language consisting of all strings of 0's and 1's not containing the string 010		

2. Use the pumping lemma to prove that the following is not context free.
 $L = \{w : n_a(w) \leq n_b(w) \leq n_c(w)\}.$

3. Consider $L = \{a^n \# a^m \mid m \geq n^2\}$. Create a push down automaton for L or use the pumping lemma for context-free languages to prove that L is not context free so there is no push down automaton for it.