

CS 302
QUIZ 3

8 October, 2019

ANSWERS

(a) (3 pts) See the relevant slide set

(b) (7 pts) **L** is **not** a regular language which we show below using the pumping lemma.

Assume **L** to be regular language and let **n** be given as in pumping lemma. Choose

$w = a^n b^{n-1} \in L$. Then $|w| = 2n-1 \geq n$ and by the pumping lemma $w = a^n b^{n-1} = xyz$

where $|xy| \leq n$ and $|y| > 0$ and therefore $x = a^m$; $y = a^k$ and $z = a^{n-k-m} b^{n-1}$ with $k > 0$

and $m+k \leq n$. According to the pumping lemma we must have $xy^jz \in L$ for all $j \geq 0$

and in particular for $j=0$, $xz \in L$ must hold. But $xz = a^m a^{n-k-m} b^{n-1} = a^{n-k} b^{n-1} \notin L$

since $k > 0$ and $n-k \leq n-1$ violating the definition of **L**.

Therefore our assumption is contradicted and **L** is not a regular language.