CS 302
QUIZ 3

27 February, 2020

ANSWERS

(a) *(5 pts) See the relevant slide.*

(b) *(5 pts) The language* $L = \{w \in (0+1)^* \mid w = 0^k 1^m , k \geq m+1 ; k,m \geq 0 \}$

is ***not*** *a regular language. Assume it is regular and choose* $w = 0^{n+1} 1^n \in L$ *, where* n *is as given by the pumping lemma (PL). By the PL ,* $w = x.y.z ; |x.y| \leq n ; |y| > 0$ *and* $x.y^j.z \in L$ *for* $j=0,1\ldots$ *; in particular for* $j=0$ *,* $x.z \in L$ *. But by construction* $x.y = 0^p , p \leq n , y = 0^q , q > 0$ *and* $z = 0^{n+1-p} 1^n$ *; therefore*

$x.z = 0^{p-q} 0^{n+1-p} 1^n = 0^{n+1-q} 1^n \notin L$ *since* $q > 0$ *and so* $k=n+1-q \leq n = m$

This voilation of the PL contradicts the assumption that L *is a regular language.*