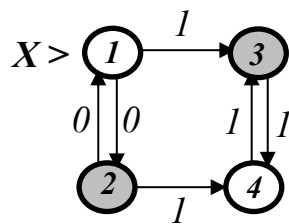


CS 302
REMOTE QUIZ 3

17 March, 2021

ANSWERS

(a) (5 pts) L_1 is a **regular** language which is accepted by the NFA X below .



(b) (5 pts) L_2 is **not** a regular language. Let $N > 0$ be given by the **Pumping Lemma** and choose $w = 0^N.1^{N+1}$; then $|w| = 2N + 1 \geq N$ and $w \in L_2$ since $|n-k| = |N-N-1| = 1$.

By PL $w = x.y.z$; $|x.y| \leq N$; $|y| > 0$ so that $x = 0^p$, $y = 0^q$, $q > 0$ and $z = 0^{N-p-q}.1^{N+1}$.

Therefore for $j=0$, $x.z = 0^p . 0^{N-p-q}.1^{N+1} = 0^{N-q}.1^{N+1} \notin L_2$ since $|N-q - N - 1| = q+1 > 1$.

This contradicts that L_2 is regular.