CS 374 Spring 2018
Homework 3

Nathaniel Murphy (njmurph3)
Tanvi Modi (tmodi3)
Marianne Huang (mhuang46)

Problem 3 Solution:

1. $L = \{xx^R w \mid w, x \in \{0,1\}^+\}$

Consider a fooling set $F = \{0^n 1 \mid n > 0\}$
Let $u, v \in F$ where $u \neq v$
Let $u = 0^i 1$
Let $v = 0^j 1$
Distinguishing suffix $w = 10^i w, w \in \{0,1\}^+$
$uw = 0^i 110^i w \in F$
$vw = 0^j 110^i w \notin F$
F is a fooling set and $|F| = \infty$, therefore L is irregular.

2. $L = \{0^i 1^j 0^{ij} \mid i, j > 0\}$

Consider a fooling set $F = \{0^m 1^n 0^{mn} \mid m, n > 0\}$
Let $u, v \in F$ where $u \neq v$
Let $u = 0^m 1^m$
Let $v = 0^m 1^n$
Distinguishing suffix $w = 0^{mm}$
$uw = 0^m 1^m 0^{mm} \in F$
$vw = 0^m 1^n 0^{mm} \notin F$
F is a fooling set and $|F| = \infty$, therefore L is irregular.