

Posted: Oct 28, 2019

**Due: TBA**—you have at least three weeks to do the problems

## Problem Set No. 2

**NB.** *All problems are equally weighted and will be assigned a letter grade; an overall letter grade for the paper will be computed using York's 0–9 gpa scale.*



This is not a course on *formal* recursion theory. Your proofs should be informal (but **not** sloppy), correct, and informative (and if possible short). Please do not trade length for correctness or readability.



Most problems are from “Theory of Computation”, Section 2.12.

- (1) (**Grad**) In the text it is proved —*using the arithmetisation* of URMs— that the  $S_{mn}$  functions are strictly increasing, that is, for any  $k$ , we have  $\lambda x_i.S_m^n(k, \vec{x}_m) \nearrow$ .  
*Prove that the  $S_{mn}$  functions obtained in class —without arithmetisation— have the same property.*  
*Hint.* This will be via CT.
- (2) From Section 2.12: Do 23, 29, (**Grad**) 38.
- (3) From Section 2.12 also do 43, 45.
- (4) From Section 2.12 also do the following **from scratch, without invoking Rice's Lemma!**: 47, 48, 49.