COSC 4111/5111 —Winter 2014

Posted: Jan 17, 2014
Due: TBA by a NEWS item on the course web page.

Problem Set No. 1

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.*

The problem set list for *grad students* enrolled in CSE5111 is the entire list here. Undergrads *should omit the problems marked "Grad".*

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

All problems are from the "Theory of Computation Text", or are improvisations that I completely articulate here.

(1) Dress up the primitive recursion

$$\begin{aligned} two(0) &= 1 \\ two(x+1) &= two(x) + two(x) \end{aligned}$$

to make it conform with the rigid primitive recursion schema.

(2) (**Grad**). Do Exercise 2.1.2.43

From Section 2.12.

(3) (**Grad**). Do problems 4, 20, 22.

(4) Do problems 6, 11, 12, 19.

(5) Write a "nice and clean" loop program which computes $\lambda x.\lfloor x/2 \rfloor$. The program must only allow instruction-types $X \leftarrow 0$, $X \leftarrow X + 1$, $X \leftarrow Y$ and **Loop** $X \ldots$ **end**. It must *not* nest the Loop-end instruction! It is required that you give a convincing general argument (*not* a "trace") as to why your program works as specified.

(6) Do problem 27, 28.

(7) (**Grad**). Do problem 24, 29.