

Math 6010 - Assignment 3

Due September 16, 2015

- (11) Prove: A partial function $f: \Sigma^* \rightarrow_p \Pi^*$ is Turing computable iff its graph

$$L_f = \{(a, b) \in \Sigma^* \times \Pi^* \mid a \in \text{domain}(f), f(a) = b\}$$

is recursively enumerable.

- (12) Argue that the language of multivariate polynomials (in some appropriate coding) over the integers that have an integer root is recursively enumerable.

- (13) Show that

$$\text{succ} := \lambda n f x. f((n f)x)$$

defines the successor function on natural numbers (Church numerals) in λ -calculus.

- (14) Reading assignment: Read pages 379-380 in [1] (available in the Math library) on codes for Turing machines.

REFERENCES

- [1] Hopcroft, John; Motwani, Rajeev; Ullman, Jeffrey. Introduction to automata theory, languages, and computation. Pearson, 3rd edition, 2006.