York University                           EECS 2001                           July 27, 2015

# Homework Assignment #9
# Due: August 5, 2015 at 7:00 p.m.

Recall that if $L$ is a language over the alphabet $\Sigma$, then

$$\text{PREFIX}(L) = \{x : \exists y \in \Sigma^* \text{ such that } xy \in L\}.$$

**1.** Prove that, for every recognizable language $L$, $\text{PREFIX}(L)$ is also recognizable.

**2.** Let $L_1 = \{\langle M, x, t \rangle : M$ is a Turing machine, $x$ is a string and $t$ is a natural number such that $M$ halts on input $x$ after taking at most $t$ steps$\}$.

    **(a)** Show that $L_1$ is decidable.

    **(b)** Show that $\text{PREFIX}(L_1)$ is not decidable.