CSE 3321 - Additional Problems
Do not turn in

1. A *Turing machine with stay put instead of left* is similar to an ordinary Turing machine, but the transition function has the form

$$\delta : Q \to Q \times \Gamma \times \{R, S\}.$$

   At each point the machine can move its head right or let it stay in the same position. Show that this Turing machine variant is *not* equivalent to the usual version. What class of languages do these machines recognize?

2. Show that every infinite Turing-recognizable language has an infinite decidable subset.

3. Let C be a language. Prove that C is Turing-recognizable iff a decidable language D exists such that $C = \{x : \exists y(\langle x, y \rangle \in D)\}$.

4. Prove that there exists an undecidable subset of $\{1\}^*$.