

## CS 350 Theory of Computation

### Assignment 4 (8 marks)

#### Question 1 (1 marks)

Let  $\mathcal{B}$  be the set of all infinite sequences over  $\{a, b\}$ . Show that  $\mathcal{B}$  is uncountable, using a proof by diagonalization.

#### Question 2 (1 marks)

Let  $T = \{(i, j, k) \mid i, j, k \in \mathcal{N}\}$ . Show that  $T$  is countable.

#### Question 3 (2 marks)

Let  $A = \{\langle R, S \rangle \mid R \text{ and } S \text{ are regular expressions and } L(R) \subseteq L(S)\}$ . Show that  $A$  is decidable.

#### Question 4 (2 marks)

Show that  $EQ_{CFG}$  is undecidable.

#### Question 5 (1 marks)

Show that  $EQ_{CFG}$  is co-Turing-recognizable.

#### Question 6 (1 marks)

Problem 5.3 (page 211—second edition of Sipser).

**Date Due:** before the end of class on **Thursday, April 2, 2009**. No late assignment will be accepted.