Homework Assignment #10
Due: August 12, 2015 at 7:00 p.m.

1. Let $L_1 = \{\langle M_1, M_2 \rangle : M_1$ and M_2 are Turing machines and there exists a string x that is accepted by M_1 but not by $M_2\}$.

    (a) Is L_1 recognizable? Prove your answer is correct.

    (b) Is $\overline{L_1}$ recognizable? Prove your answer is correct.

    (c) Is L_1 decidable? Prove your answer is correct.

2. Let $L_2 = \{\langle M_1, M_2 \rangle : M_1$ and M_2 are Turing machines and there exists a string x that is accepted by M_1 and rejected by $M_2\}$.
Is L_2 recognizable? Prove your answer is correct.

3. Let $L_3 = \{0^i 1^j 2^k : i = j$ or $j > 2k\}$. Give a context-free grammar for L_3. You do not have to prove your answer is correct. However, for each variable you use in your grammar, you must state the set of strings that is generated by that variable.