EECS 343: Theoretical Computer Science, Homework Exercise 6
due Monday, March 2, 2020 before class

Problem 1: (Sipser 6.6) Describe two different Turing machines, M and N, that, when started on any input, M outputs $\langle N \rangle$ and N outputs $\langle M \rangle$.

Problem 2: Write a Java class that contains two methods `A` and `B` such that the class outputs itself. Submit the code directly on Canvas.

Problem 3: Consider the model $\mathcal{F}_m = (\mathcal{Z}_n, +, \times)$ in which the universe is $\mathcal{Z}_m = \{0, 1, \ldots, m-1\}$ and the relations are $+$ and $\times$, and the computations are done modulo m. Show that our proof from class that $Th(\mathcal{N}, +, \times)$ contains unprovable sentences fails for $Th(\mathcal{F}_m)$. (Note that Sipser 6.13 is to prove that $Th(F_m)$ is decidable.)