CS 3800, Fall 2017 (Clinger's section)
Homework 7 (40 points)
Assigned: Wednesday, 25 October 2017
Due: Wednesday, 1 November 2017

1. [10 pts] If Σ is an alphabet, then $W_n = \{w \mid w \in \Sigma^* \text{ and } |w| \leq n\}$ is the set of all possible inputs of length less than or equal to n. Prove: If M_1 and M_2 are DFAs over an alphabet Σ, then there exists a positive integer p such that $L(M_1) = L(M_2)$ if and only if $(L(M_1) \cap W_p) = (L(M_2) \cap W_p)$.

2. [10 pts] Using that result and the British Museum Algorithm, prove EQ_{DFA} is Turing-decidable.

3. [10 pts] Let $A = \{\langle M_1, M_2 \rangle \mid M_1 \text{ and } M_2 \text{ are DFAs and } L(M_1) \subseteq L(M_2)\}$. Show that A is decidable.

4. [10 pts] Prove: EQ_{CFG} is undecidable. (Hint: Use Theorem 5.13.)