Assignment 6

(Please work in groups of two or three and submit one answer sheet for the group.)

1. Consider the set of all strings with the alphabet \{#\} with length a prime number. Use the Pumping Lemma to show that this language is nonregular.

2. Determine the language of the following unrestricted grammar. Justify your answer.

\[
S \rightarrow ABCS \mid ABC
\]
\[
AB \rightarrow BA \quad BA \rightarrow AB
\]
\[
AC \rightarrow CA \quad CA \rightarrow AC
\]
\[
BC \rightarrow CB \quad CB \rightarrow BC
\]
\[
A \rightarrow a \quad B \rightarrow b \quad C \rightarrow c
\]

3. Define a 2-PDA like a PDA except that it has two stacks.
   (a) Give one language that is accepted by some 2-PDA but not by any PDA.
   (b) Prove that the class of languages accepted by 2-PDAs is closed under concatenation.

4. Draw the TM that accepts all strings of the form \( w#w \) where \( w \) is a binary string.

5. Determine the language of the following TM.

Due: Thursday October 27