CS 181: Formal Languages and Automata Theory	**Spring 2021**
Homework 8	
Assigned: Thursday 20 May	*Due: Thursday 27 May 3:00pm PDT*

Problem 1

Let $\Sigma = \{a, b\}$. Show two different left-most reductions of the string "baabba" in the following context-free grammar:

$$
\begin{aligned}
S &\longrightarrow AB \mid BA \\
A &\longrightarrow AS \mid BC \mid a \\
B &\longrightarrow BS \mid AD \mid b \\
C &\longrightarrow AA \\
D &\longrightarrow BB
\end{aligned}
$$

Here, the variable set is $\{S, A, B, C, D\}$, and the start variable is S.

Problem 2

Let L_P be a Recursively Enumerable (R.E.) language, and let L_A be a Recursive language.

a. Prove that $L_P \cup L_A$ is R.E. by showing a construction using the Universal TM (UTM) for a TM procedure that recognizes the union.

b. *Briefly* explain why we cannot say that the union is Recursive. You may use the style of argument discussed in class. You do *not* have to prove it.