Due: October 24

1. Let $G$ be the grammar

$$
S \rightarrow TaTaT \\
T \rightarrow aTb | bTa | TT | \varepsilon
$$

(a) Using the method from class, give a PDA $M$ with $L(M) = L(G)$.

(b) Show an accepting computation for $M$ on the string $baaaab$ by giving a chart with the state, tape contents, and stack contents after each step.

2. Let $M$ be the following PDA:

(a) Convert $M$ into a “special” PDA $M'$.

(b) Give the Case 2b rules when you convert $M'$ into a CFG $G$ using the method from class.

3. In class, we gave a PDA $M$ that recognizes $A = \{ w \in \{0, 1\}^* |$ every prefix of $w$ has at least as many 0’s as 1’s $\}$. We converted $M$ into an equivalent special PDA $P$ and then converted $P$ to a CFG $G$. (If you missed class, you can find these in the video. I did not use the names $A, M, P$ and $G$ in my lecture.)

(a) Give a chart with the state, tape contents, and stack contents after each step to show how $P$ accepts 001001 by a computation that empties its stack.

(b) Give a parse tree in $G$ for the string 001001 corresponding to the computation that $P$ carries out on the string.

4. Problem 2.18. [This problem has a solution in the book. You do not have to turn in a solution. I just want you to read and understand the solution given in the book.]