Theory of Computation
Homework 6.

Due Date: Thursday, October 22.

1. Suppose that $A$ is recognized by PDA $M$. Give a PDA to recognize $A^*$.

2. Suppose that $A$ is generated by CFG $G_A$. Give a CFG to generate $A^*$.

3. Give CFG’s to generate the following languages.
   
   (a) $A = \{w \mid w$ has odd length, $w \in \{a, b\}^*$ and the middle symbol of $w$ is an $a}\}.$
   
   (b) $B = \{ww^R x \mid w, x \in \{a, b\}^*\}.$
   
   (c) $C = \{w \mid w \in \{a, b\}^*$ and $w$ contains an equal number of $a$’s and $b$’s$\}.$
   
   Hint: suppose that the first character in $w$ is an $a$. Let $x$ be the shortest initial substring of $w$ having an equal number of $a$’s and $b$’s. If $|x| < |w|$, then $w$ can be written as $w = xy$; what can you say about $y$? Otherwise, $x = w$ and $w$ can be written as $w = azb$; what can you say about $z$?