1. Show the following CFG generates the language defined by the RE $a^*bb$
   
   \[ S \rightarrow aS | bb \]

2. Show the following CFG generates the language of all strings with a triple $b$
   
   (HINT: What’s the regular expression?)
   
   \[ S \rightarrow XYX \]
   \[ X \rightarrow aX | bX | \Lambda \]
   \[ Y \rightarrow bbb \]

3. Find a CFG for each of the following:
   
   (a) All words in which the letter $b$ is never tripled
   (b) All words that have different first and last letters
   (c) All words that don’t have the substring $ab$

4. Describe the language generated by the following CFG:
   
   \[ S \rightarrow SS \]
   \[ S \rightarrow XXX \]
   \[ X \rightarrow aX | Xa | b \]

5. Write a CFG to generate the language MOREA. By definition MOREA contains all strings that have more $a$’s than $b$’s

6. Show the following CFGs are ambiguous
   
   (a) \[ S \rightarrow XaX \]
      \[ X \rightarrow aX | bX | \Lambda \]
   (b) \[ S \rightarrow aSX | \Lambda \]
      \[ X \rightarrow aX | a \]

7. For the CFGs in Problem 5, provide a non-ambiguous CFG