You are strongly encouraged to do all of the problems. However, only the ones marked with (*) will be graded.

Note: Problems 3-5 are perfect for when you’re stuck in traffic, or taking a shower!

(*) Question 1: Problem 8.11, part b. (You must use Algorithm 8.1 to derive the grammar.)

Question 2: In class we did not complete the proof that Algorithm 8.1 is correct. Assume the algorithm returns a correct grammar for the input regular expression $r_1$. Prove that it outputs the correct grammar for $r = r_1^*$. 

Question 3: Give a grammar (not necessarily regular!) for the following language $L$ over alphabet $\Sigma = \{a, b\}$. $L = \{a^n b^n | n \geq 0\}$ (Note, this is not the same as the language $L' = \{a^* b^*\}$)

Question 4: Give a regular grammar for the language $L$ in Question 4.

Question 5: Give a regular grammar for the following language $L$ over alphabet $\Sigma = \{a, b\}$. $L = \{a^n b^m | n, m \geq 0\}$. 