CIS 511: Spring 2015
Problem Set 2: Due February 11 by 5 PM

1. Exercise 2.2, parts a and b.

2. Exercise 2.6 part c. This exercise has its answer given in the book. That is, the book gives a grammar generating the language, but does not *prove* that this grammar actually generates the desired language. Carefully prove that this is in fact the case by showing that every string in the language is generated by the grammar and that no string outside the language is generated by the grammar.

3. Exercise 2.15.

4. Exercise 2.16.

5. Problem 2.21.

6. Problem 2.23. [**Hint:** If $x \neq y$, then there must exist an i such that x and y differ in the i^{th} position. If x and y are each of length n and differ in the i^{th} position (say x has an a and y has a b in this position), then think of the string xy as broken up into 6 parts $u\,a\,v\,p\,b\,q$ where u and v are each of length $i-1$ and p and q are each of length $n-i$. Come up with a grammar for generating all such strings.]

7. Describe a PDA (in English) that accepts the language of the previous problem. You don't have to give all the details of the transition function, but your English description should be sufficiently precise that a reader can easily construct the transition function from it.

8. Problem 2.24.

9. Problem 2.30, parts a and d.

10. Problem 2.35.