CS 374 **Spring 2015**

Homework 3

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2. (a) The grammar is as follows:

$$\langle \text{Start} \rangle \longrightarrow 1\langle \text{Anything} \rangle 0|0\langle \text{Anything} \rangle 1|1\langle \text{Start} \rangle 1|0\langle \text{Start} \rangle 0$$

$$\langle \text{Anything} \rangle \longrightarrow 0\langle \text{Anything} \rangle|1\langle \text{Anything} \rangle|0|1$$

The grammar is basically that if the ends of the string are symmetric (both 1 or both 0), then the inside cannot be a palindrome, and it's recursively breaking down the problem. Else, if the ends are different, then the inside can be anything, and accordingly "Anything" accepts any string.

(b)

$$\langle \text{Start} \rangle \longrightarrow XY|\epsilon$$

$$X \longrightarrow ab|aXb$$

$$Y \longrightarrow bc|bYc$$

In the grammar, "X" works to add a to the string. For every a, we need to add a b to keep it balanced. Similarly "Y" adds c at the end, and proceeds every c with a b, to keep it balanced. This way strings are constructed by specifying an arbitrary number of a's and c's, and the number of b's will update accordingly.