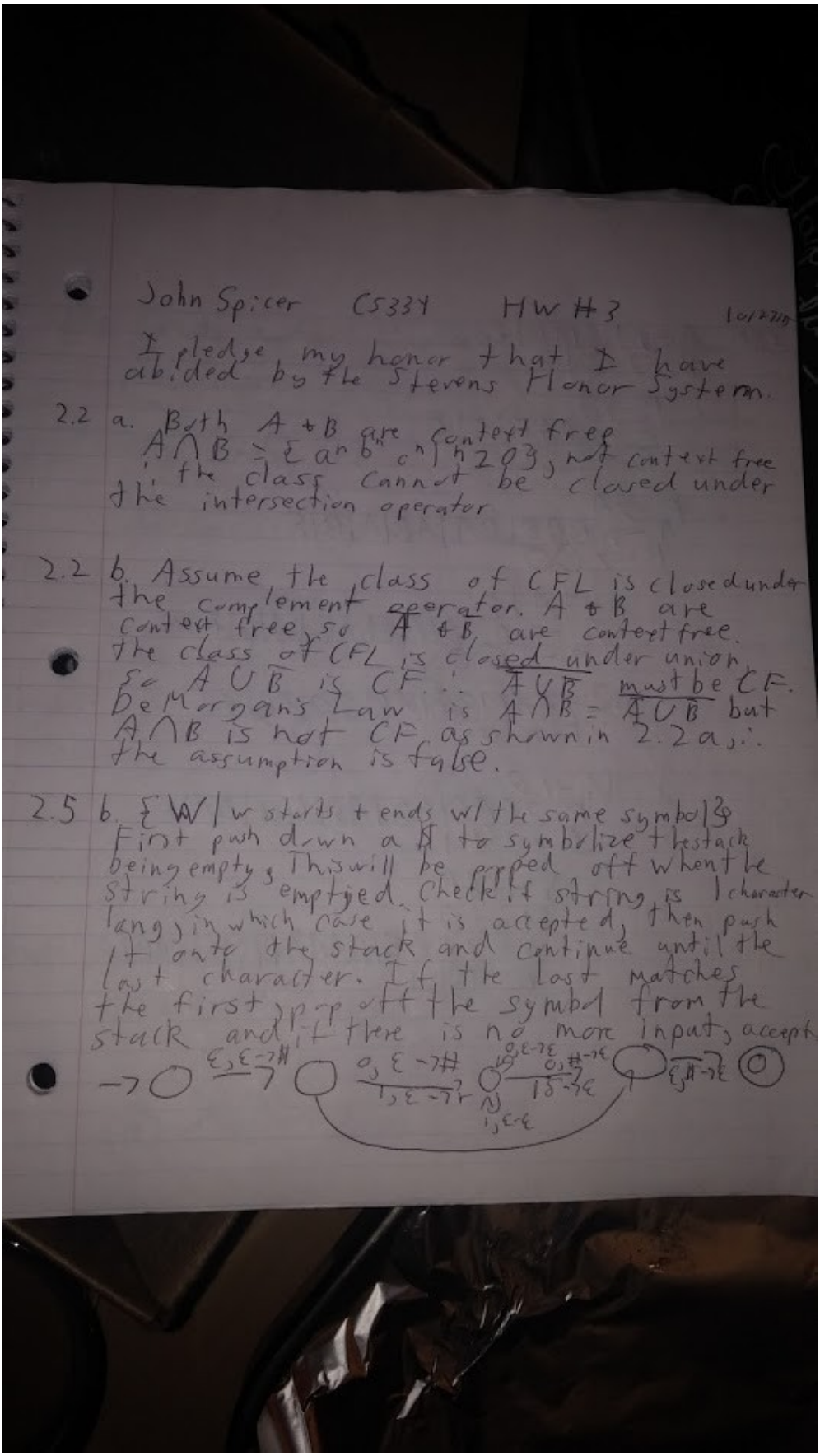
John Spicer
I pledge my honor that I have abided by the Stevens Honor System
10/27/15



2.14 $A \to BAB \mid B \mid \varepsilon$
$B \to 00 \mid \varepsilon$

$P \to A$
$A \to BAB \mid B \mid \varepsilon$
$B \to 00 \mid \varepsilon$

$P \to A$
$A \to BAB \mid BA \mid AB \mid A \mid B \mid \varepsilon$
$B \to 00$

$P \to A \mid \varepsilon$
$A \to BAB \mid BA \mid AB \mid A \mid B \mid BB$
$B \to 00$

$P \to BAB \mid BA \mid AB \mid 00 \mid BB \mid \varepsilon$
$B \to 00$

$U \to 0$
$P \to BAB \mid BA \mid AB \mid UU \mid BB \mid \varepsilon$
$B \to UU$

$V \to AB$
$U \to 0$
$P \to BAB \mid BA \mid AB \mid UU \mid BB \mid \varepsilon$
$B \to UU$

2.26 Create a Start Variable and form a string using substitutions according to the productions. Every production either creates two variables or a terminal. It takes $n-1$ steps to grow the string from the start to n variables, and another n steps to change the variables to terminals; it must take $2n-1$ steps to derive string w of length n.

Construct:

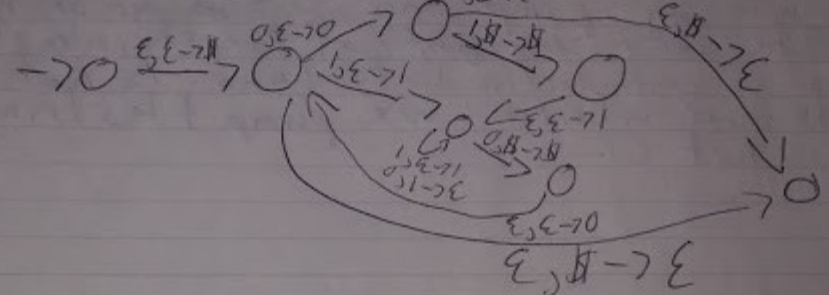
$S \to A$

~~$A \to 0A1$~~

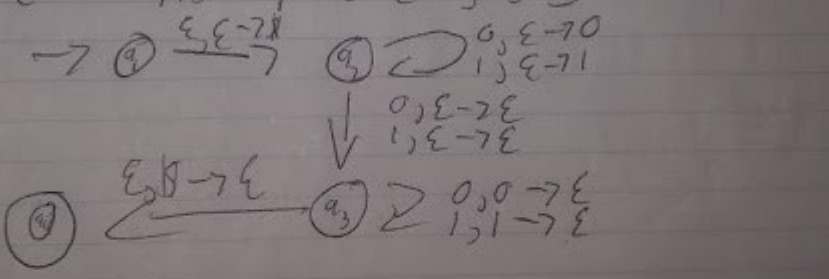
$A \to 0A1A \mid 1A0A \mid \varepsilon$

Yes, ambiguous

Construct:



Mod: $\{ww^R \mid w \in \{0,1\}^*\}$



2.30 a. $\{0^n1^n0^n1^n \mid n \geq 0\}$ p is pumping length

$0^p1^p0^p1^p$ must be in language

Assume Lang is CF

1. $S = uvxyz$ s is long enough so uv^ixy^iz for all $i \geq 0$
   s is in the language
2. $|vy| > 0$
3. $|vxy| \leq p$.
   Wherever we pump the string, there will be an uneven # of zeros, ones, or zeros+ones. We cannot reach so far that we can pump ones or zeros on both the left & right of the string. This is a contradiction so the lang. is not CF because wherever we pump the string, it is not CF

2.32 Assume lang is CF. P is pumping length.

$s = 1^p 3^p 2^p 4^p \in C$

1. $s = uvxyz$ which is long enough so $s = uv^i xy^i z$ for all $i \geq 0$
2. $|vy| > 0$
3. $|vxy| \leq p$

Wherever the string is pumped, a contradiction occurs. If 1 or 2 is pumped they are not even length, same for 3 or 4. This contradiction means the lang is not CF and the assumption is false.