HWK 5

1.

a) $S_0 \to S$

$S \to 0A1 \mid 1A0 \mid 0S1$

$A \to 0 \mid 1 \mid \epsilon$

b) $S_0 \to S$

$S \to AAAS \mid \epsilon$

$A \to 0 \mid 1$

c) $S_0 \to S$

$S \to 0S0 \mid 1S1 \mid \epsilon$

2. a) w start with a number and ends with the same number or w starts with n 0's followed by n 1's

b) Assume language is regular. Let p be PL. Choose $s = 0^p1^p$, so $|0^p1^p| \geq p$. By PL, s can be partitioned into $s = xyz$ such that for all $i \geq 0$, $xy^iz \in L$.

If $p = 3$, then $w = 000111$. So $\underbrace{00}_{x}\underbrace{01}_{y}\underbrace{11}_{z} = xy^1z$.

For $i = 2$ & $p = 3$, $w = 00010111$.

Since w is now not in the language. ∴ by contradiction of condition 1 of PL, the language is not regular.