Jonny Hughes

Automata

3/27/20

H#14

(1-3) Show that each language **is** or **is not** context-free. To show that it **is** context-free, provide a CFG or PDA; to show that it is **not** context-free, utilize the pumping lemma.

- L1 = { xy $\in$ {0,1}* | #0(x)+1 = #1(y) *and* |x| = |y|}
  - Given that pumping lemma are required to at most pump 2 strings in parallel, and this grammar by nature of its relationship between 4 counts of 0(x), 1(y), abs(x) and abs(y), would require there to be NO pumping lemma which will succeed for this grammar, Hence, this is not a Context-free language.
- L2 = {0a1b2c | 0 ≤ a ≤ b ≤ a+c }
  - S → AC
  - A → 0AB | ε
  - B → 1
  - C → C2 | BC2 | ε
- L3 = {0a1b2c | 0 ≤ a ≤ b ≤ a+a }
  - This is a context-free language, as it has this CFG.
  - S → AC
  - A → 0AB | ε
  - B → 1 | 11
  - C → 2C | ε