CSCI338 – Pumping Lemma Handout

Pumping Lemma

Given a regular language L, $\exists$ a number p such that <u>any</u> string $s \in L$, with $|s| \geq p$, can be divided into three pieces, $s = xyz$ satisfying:

1. $xy^i z \in L$, $\forall i \geq 0$.
2. $|y| > 0$.
3. $|xy| \leq p$.

Proof Blueprint

Claim: The language $L =$ <some language> is not regular.

Proof: Suppose L is regular. Let p be the number from the pumping lemma.

Consider $s =$ <TODO: Select s that will work with $s \in L$ and $|s| \geq p$ >.
Since $s \in L$ and $|s| \geq p$, the conditions of the pumping lemma must hold for $s = xyz$.

<TODO: Find conditions on what y must equal>

Consider the string $s' = xy^{\text{<TODO: Select } i \text{>}}z =$ <TODO: Show what s' equals>

<TODO: Show s' is not in L>

$\Rightarrow s' \notin L$, which is a contradiction of the pumping lemma.
Therefore, the language is not regular.