

Theory of Computation, CSCI 438 spring 2022
More examples proving that languages are not regular, Feb. 4

Useful notation: $s_i = xy^iz$

Note: In using the pumping lemma to show that a language is not regular, you can't put a limit on p and you can't decide what decomposition will be used.

Using the pumping lemma to show that a language is not regular can be seen as a game played between you and another person. You are trying to show that the pumping lemma does not hold, so the language must not be regular.

1. Opponent picks a p .
2. You pick a string s where $s \in L$ and $|s| \geq p$.
3. Iterate:
 - Opponent splits the string $s = xyz$ so that $|xy| \leq p$ and $|y| > 0$.
 - You pick i such that the pumped string $s_i = xy^iz$ is not in L .
4. If the opponent has tried all possible splits and you have shown that none work, you win the game, the pumping lemma did not hold, and the language must not be regular.