Arab Academy for Science &Technology and Maritime Transport (AASTMT)
College of Computing and Information Technology (CCIT)
Theory of Computation CS311 – Spring 2014
Dr. Manal Helal
Eng. Nada Mahmoud

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JFLAP treats the regular pumping lemma as a two-player game. In this game, Player A is trying to find a *xyz* decomposition that is always in the language no matter what the *i* value is. Player B is trying to make it as hard as possible for player A to do so. If player B can pick a strategy such that he or she will always win regardless of player A's choices, meaning that no adequate decomposition exists, it is equivalent to proof that the language is not regular.

The game is played like this:

1. Player A picks an integer for m.
2. Player B picks a string w such that w is a member of L and $|w| \geq m$.
3. Player A picks the partition of w into xyz such that $|xy| \leq m$ and $|y| \geq 1$.
4. Player B picks an integer i such that $xy^i z$ is not a member of L.

If player B can do so player B wins, otherwise, player A wins.

There are two possible modes for the game, when the user goes first and when the computer goes first. In the first mode, the user is player A and the computer is player B, and thus the user should be trying to find an acceptable decomposition to pump. In the second mode, the user is player B and the computer is player A, and thus the user should be trying to prevent the computer from generating a valid decomposition.

To be able to start the game follow this tutorial:

http://jflap.org/tutorial/pumpinglemma/regular/index.html#start

Exercise1:

Use the pumping lemma to show that the following languages are not regular.

a. $A1=\{0^n1^n2^n|n\geq 0\}$ **b.** $A2 = \{www| w \in \{a,b\}^*\}$

c. $A3 =\{a^{2^n}|n\geq 0\}$ (Here, a^{2^n} means a string of 2^n a's.)