CS 373: Theory of Computation (Summer 2011)

Pumping Lemma Game

For reference, here is a way to think of a pumping lemma proof as a game against an Adversary. If you can describe a strategy in which you always win the game, then you prove that L is not regular. But remember, your Adversary is always going to try his best to make you lose.

Turn 1: Adversary picks a number $p \geq 0$.
Turn 2: You pick a string $w \in L$, such that $\lvert w \rvert \geq p$.
Turn 3: Adversary breaks w into $w = xyz$, such that $\lvert xy \rvert \leq p$ and $y = \epsilon$.
Turn 4: You pick a number $i \geq 0$. If $xy^iz \notin L$, then you win.

In other words, can you pick a valid w and i such that no matter how your Adversary chooses the p and the valid division xyz, you will always win. If so, L is not regular.