CpSc 3500 — Goddard

In-class Practice 10: Pumping Lemma

Let S be the language of all binary strings that have odd length with a `1` in the middle (such as `10110`).

Use the Pumping Lemma to show that S is not regular.

Suppose the language S is regular.
Let k be the constant of the Pumping Lemma.
Let string $z = \mathtt{0}^k\mathtt{1}\mathtt{0}^k$.
Note that z is in S and $|z| \geq k$.
Split $z = uvw$ according to the Pumping Lemma, with $|uv| \leq k$.
Then v is contained within the first block of `0`s. So the first pump up, uv^2w, is no longer in S.
This is a contradiction of the Pumping Lemma.