The MU-Puzzle

MI $\rightarrow$ MU

Rule 1: If you possess a string whose last letter is `I`, add `U`.

Rule 2: Suppose you have `Mx`, you may add `Mxx`.

Rule 3: If `III` occurs in one of the strings, you may make a new string with `U` in place of `III`.

Rule 4: If `UU`, you can drop it.

MI
MII Mxx
MIIII Mxx
MIIIIIII Mxx
MUIIU MIU
$\varnothing$

MI $\rightarrow$ use Mxx rule ∞ times
MIIII...

I's are always a multiple of 2, thus not divisible by 3.

`MUUU`
`MIII`

Rule 1 does not affect # of I's.
Rule 2 does not give divisible by 3.
Rule 3 does not change the # of I's.
Rule 4 does not change the # of I's.

Bottom line, you will never get rid of all of the I's. Thus you cannot get MU from MI.