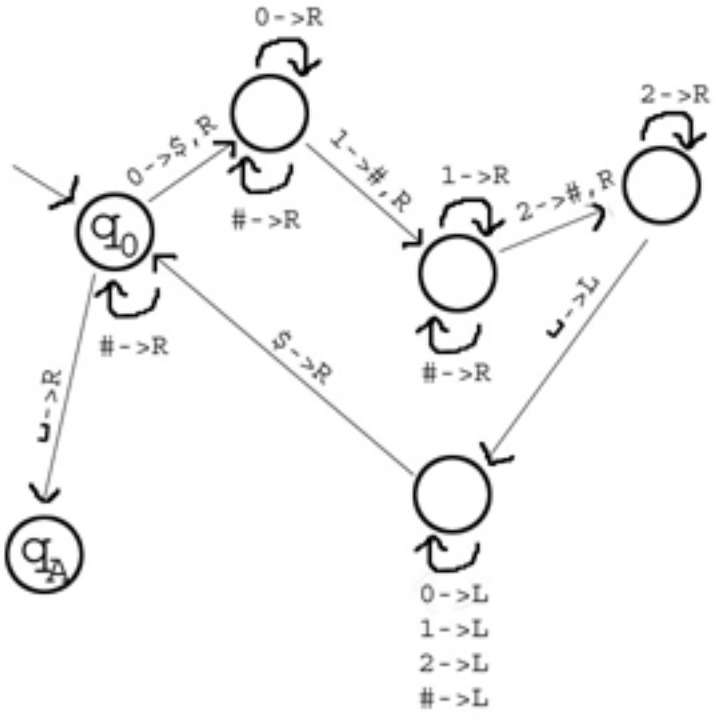
{0^n1^n2^n| n >= 0}



M = (Q, {0,1,2},{0,1,2,$,#,␣},δ,q0,qA,qR)

All transitions not specified go to the reject state (qR)

A Short Description:

The Turing Machine's tape begins with the input, for example:

000111222
^

The Machine begins by writing a $ over the first 0:

$00111222
 ^

It then reads through the rest of the 0's, and puts a # over the first 1 it finds:

$00#11222
    ^

It then reads through the rest of the 1's, and puts a # over the first 2 it finds:

$00#11#22
       ^

It then reads through the rest of the 2's. When it finds the space character (indicating the end of the input), it reads back through the string until it reads a $, after which it shifts back to the right. At this point it will be on the next 0. From here, it repeats the process, so the next time we come back to q0, the string will be:

$$0##1##2
  ^

The process will again repeat, and when we return back to q0, the string will look like:

$$$######
   ^

Now at q0, the TM will read #'s, moving to the right until it hits the end of the string. It will then move to qA, where it will accept.

Tracing through the Turing Machine, it should be clear that if any string not in the language is given as input, the machine will be 'stuck' in one of the non-accept states, and will move into a reject state.