# Turing Machine Programming

This goes beyond what you’d be required to do in exams. But we’re going to try writing a Turing Machine Program. We’re going to build a Turing Machine that can increment a binary number.

Image a tape something like this:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **0** | 0 | 1 | 1 | 1 | 1 | # |  |

To increment this binary number, we first need to go all the way to the right-hand side (where the # is).

Then we can start moving left. If we encounter a 0 then we can change it to a 1 and we’re done. But if we encounter a 1 then we can’t increment it so we need to move 1 place to the left and try and increment that and keep going until we find a 0 that we can increment.

<http://turingmachine.vassar.edu>

Using the website above write your own set of rules that would let you do this.

If you manage it here’s a few other ideas, you could try:

* Convert a Denary number on the tape into a binary number.
* Add two binary numbers together that are both stored on tape