1. (20 points) The alphabet is \{0, \ldots, 9\}. We interpret the input as a base 10 natural number, read \textit{right to left}. So the number 29139 will be read 9-3-1-9-2.

Give the diagram for a finite automata classifier that determines, given \(w\), what \(w\) is congruent to mod 6. How many states does it have?

\[10^0 \equiv 1 \pmod{6}\]
\[10^1 \equiv 4 \pmod{6}\]
\[10^2 \equiv 4 \times 4 \pmod{6} \equiv 16 \equiv 4 \pmod{6}\]

These 4s continue for all further powers of 10. Thus, this can be represented by an automaton with 7 states: