1. (20 points) The alphabet is $\{0, \ldots, 9\}$. We interpret the input as a base 10 natural number, read *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?

   $10^0 \equiv 1 \pmod 6$

   $10^1 \equiv 4 \pmod 6$

   $10^2 \equiv 4 * 4 \pmod 6 \equiv 16 \equiv 4 \pmod 6$

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