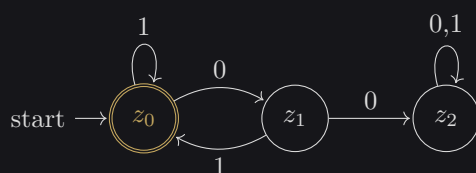# Theory of Computation — Week one

Dimitri Tabatadze · 17:09, February 24, 2024

1. Such automaton would look like this:

2. Since language is regularg if and only if it can be represented by a DFA, the complement can also be represented by just switching the accepting states for non-accepting and vice versa.

3. For a language consisting of a single string, building a regular expression is straight forward, just concatenate the symbols in the neccessary order. Unifying finite amount of regular expressions is similarly straight forward. So if a language has finite strings, building a regular expression is always possible, therefore every finite language is regular.

4. Assuming $A = \{1\}$ the DFA is:

5. For $M = (Z, A, \delta, z_s, Z_A)$ assuming that $A_1 = A_2$ for both languages

$$Z = Z_1 \times Z_2$$
$$A = A_1 = A_2$$
$$\delta((z_1, z_2), x) = (\delta_1(z_1, x), \delta_2(z_2, x))$$
$$z_s = (z_{1_s}, z_{2_s})$$
$$Z_A = (Z_{1_A} \times Z_2) \cup (Z_1 \times Z_{2_A})$$