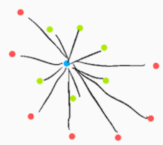


start neuron
symbols in alphabet
states to transition to

$P = NP$

Subset Sum

let $t \subseteq \mathbb{Z}$

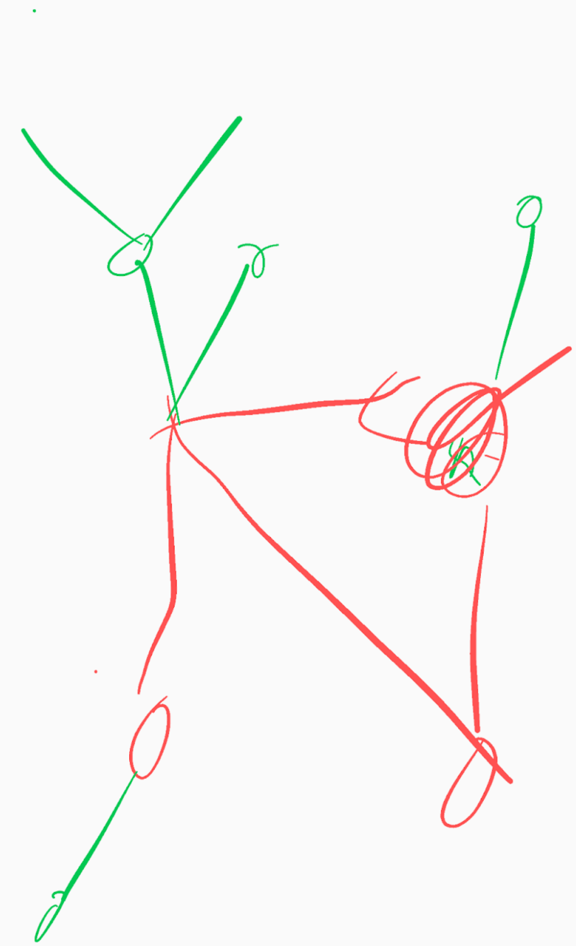
accepting state finder

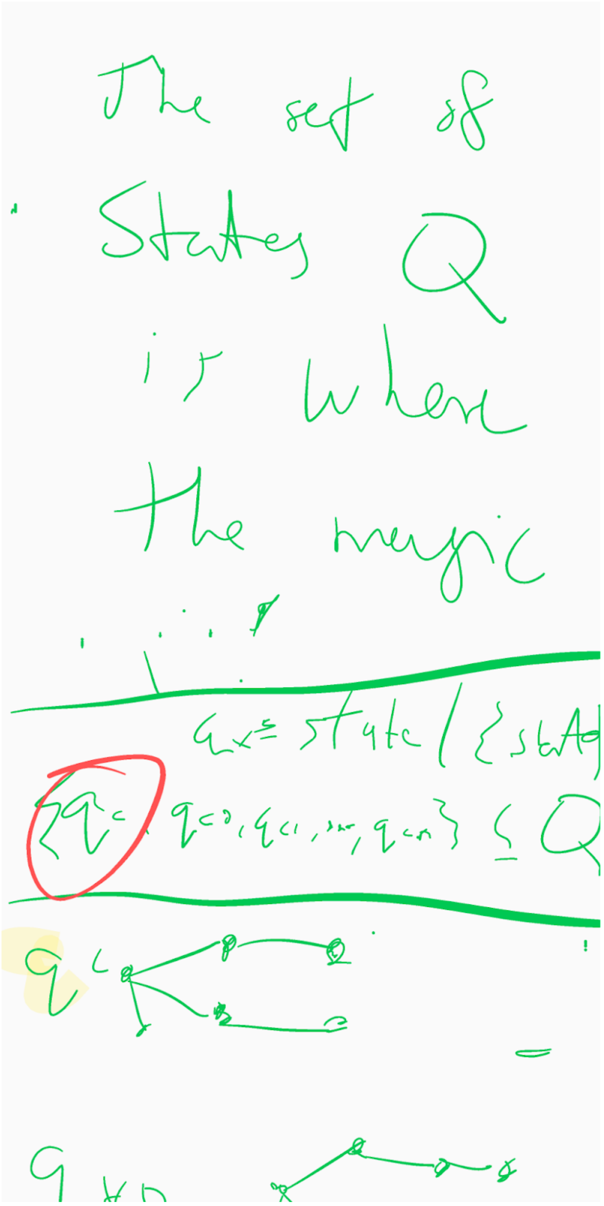
$\underline{J'(B')}$

$T(B)$

$T' \cong T$

for B'





Following Hopcroft & Ullman (1979, p. 148), a (one-tape) Turing machine can be formally defined as a 7-tuple $M = \langle Q, \Gamma, b, \Sigma, \delta, q_0, F \rangle$ where

- Γ is a finite, non-empty set of *tape alphabet symbols*;
- $b \in \Gamma$ is the *blank symbol* (the only symbol allowed to occur on the tape infinitely often at any step during the computation);
- $\Sigma \subseteq \Gamma \setminus \{b\}$ is the set of *input symbols*, that is, the set of symbols allowed to appear in the initial tape contents;
- Q is a finite, non-empty set of *states*;
- $q_0 \in Q$ is the *initial state*;
- $F \subseteq Q$ is the set of *final states* or *accepting states*. The initial tape contents is said to be *accepted* by M if it eventually halts in a state from F.
- $\delta : (Q \setminus F) \times \Gamma \not\to Q \times \Gamma \times \{L, R\}$ is a partial function called the *transition function*, where L is left shift, R is right shift. If δ is not defined on the current state and the current tape symbol, then the machine halts;[19] intuitively, the transition function specifies the next state transited from the current state, which symbol to overwrite the current symbol pointed by the head, and the next head movement.

Turing machine