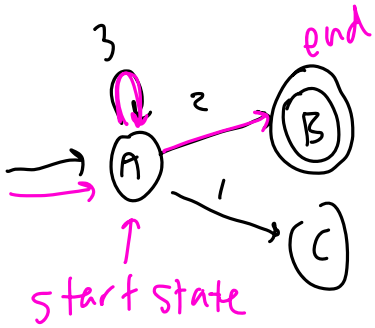
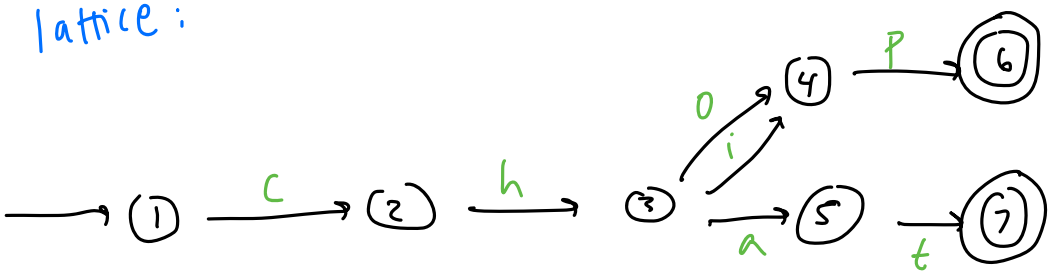
# State diagrams

directed graph where nodes are states and edges are actions




input: 332

phone lattice:




chop, chip, chat are accepted.

State diagram is defined by

- set of states $S$ → start + end states
- set of actions $A$
- transition function $\delta : S \times A \to \mathcal{P}(S)$

$S = \{1,2,3,4,5,6,7\}$

$A = \{$ english alphabet lowercase $\}$

$\delta(1, c) = \{2\}$ ($1 \in S$, $c \in A$)

$\delta(3, o) = \{4\}$

$\delta(3, i) = \{4\}$

$\delta(1, i) = ?$ $\emptyset$ or $\{1\}$ — depends on question

in this class, only deterministic state machines: $\delta : S \times A \to S$

example: build a deterministic state diagram that takes a sequence of 1,2,3's and enters an accept state whenever the sum thus far is a multiple of 3.

$A = \{1, 2, 3\}$

$S = \{$ end state mult. 3

input: 123 accept

1232 not accept