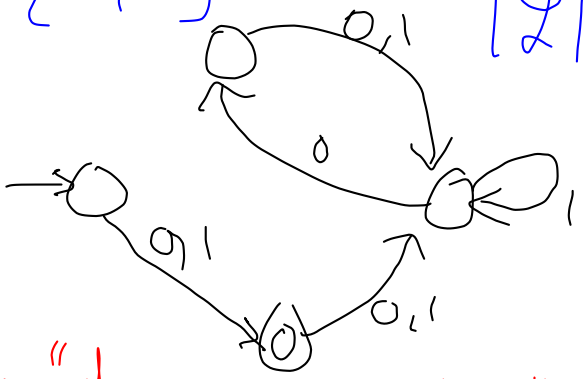
Some DFA's.

Finite Language

$\mathcal{L} = \{0, 1\}$

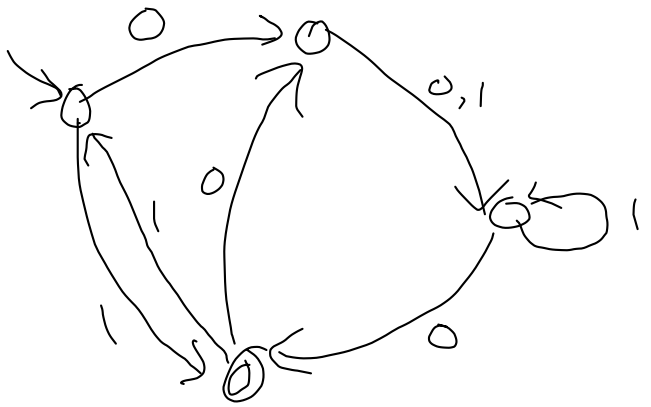
$|\mathcal{L}| = 2$



"ε" = "the empty string"

A

$|\mathcal{L}| = \infty$



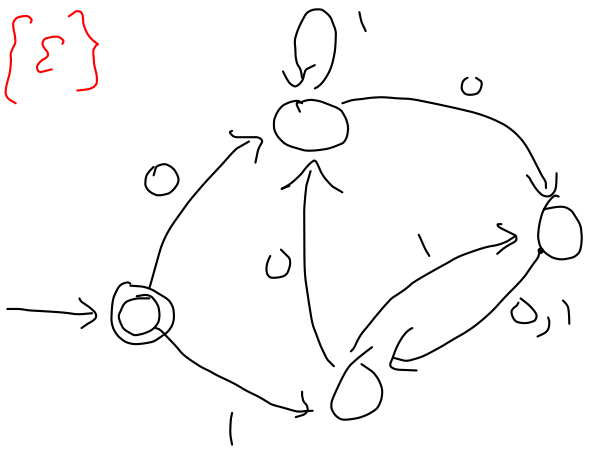
$\mathcal{L} = \{1, 000, 010, 111, \ldots\}$

D

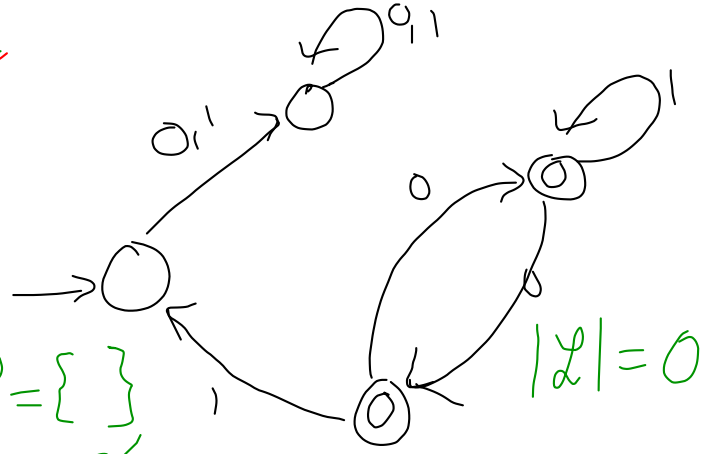
B

$\mathcal{L} = \{\varepsilon\}$

$|\mathcal{L}| = 1$



C



$|\mathcal{L}| = 0$

$\mathcal{L} = \{\ \}$

$= \emptyset$

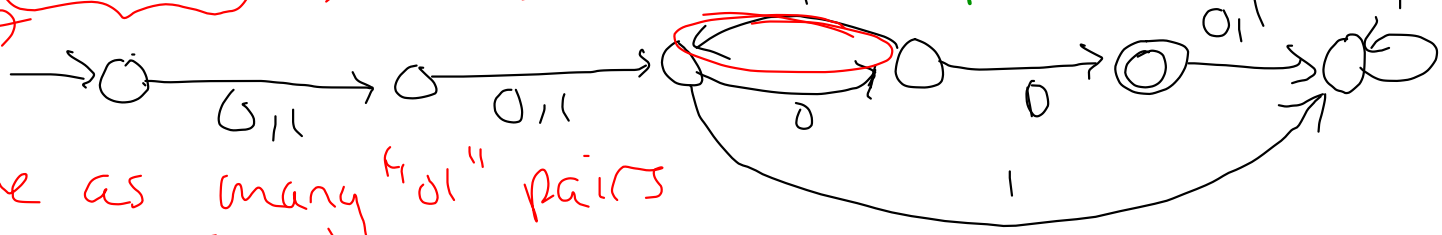
Thm: The language of a DFA includes "ε" if and only if the start state is an accept state.

epsilon = ε = Σ

Thm: A DFA has an infinite language if and only if there is some path from the start state to an accept state that contains a loop.

Explicit description of an infinite # of accepted strings.

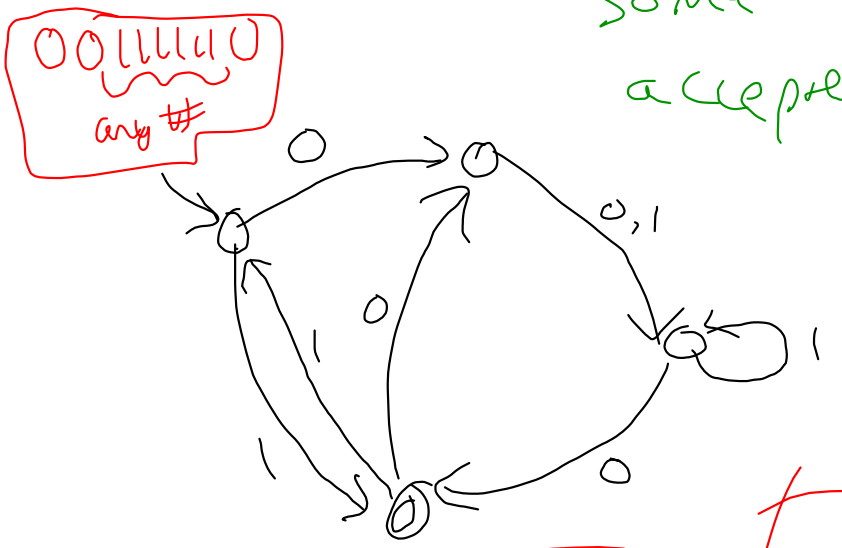
$L = \{00101010, \ldots\}$



Can have as many "01" pairs as you want.

Some DFA's.

Give an explicit description of some infinite family of accepted strings.



"Any string of 1's of odd length"

OR

$L = \{1111\ldots1, \ldots\}$ (any odd #)

Any string of 0's of length $3k$.

Any of these 3 descriptions would be fine answers on an exam.

Q1: Build a DFA that accepts a string if and only if its first bit is 0.

Q2: Build a DFA that accepts a string if and only if its last character is a 1.

Q3: Build a DFA that accepts a string if and only if it has odd length.

Q4: Build a DFA that accepts a string if and only if it has the same # of 0^s as 1^s.