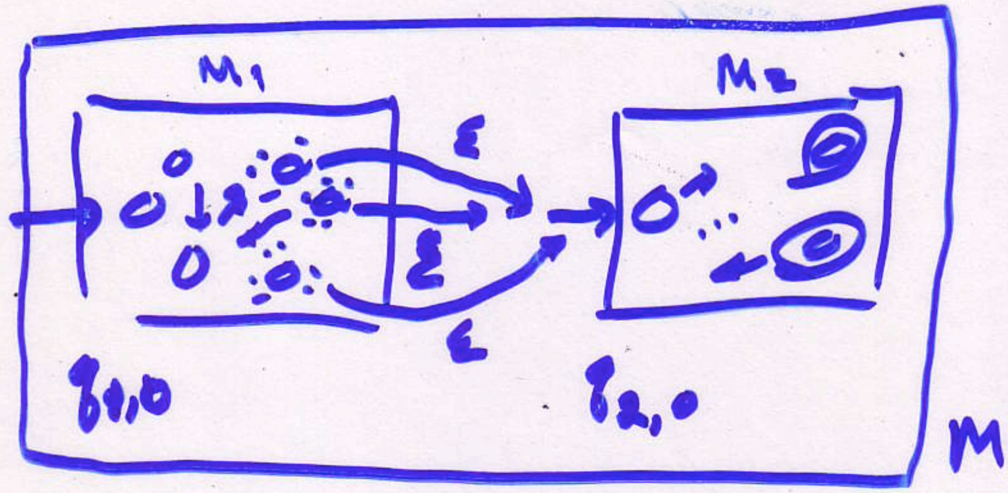
For $i=1,2$, NFA M_i, $L_i = L(M_i)$



I. if $x \in L_1$, $y \in L_2$ then $xy \in L(M)$ ...

II. Suppose $w \in L(M)$

So M reaches F reading w.

But no state of M_1 is in F and only transitions between M_1 & M_2 are ε-transitions <u>from</u> F_1 <u>to</u> q_{20}

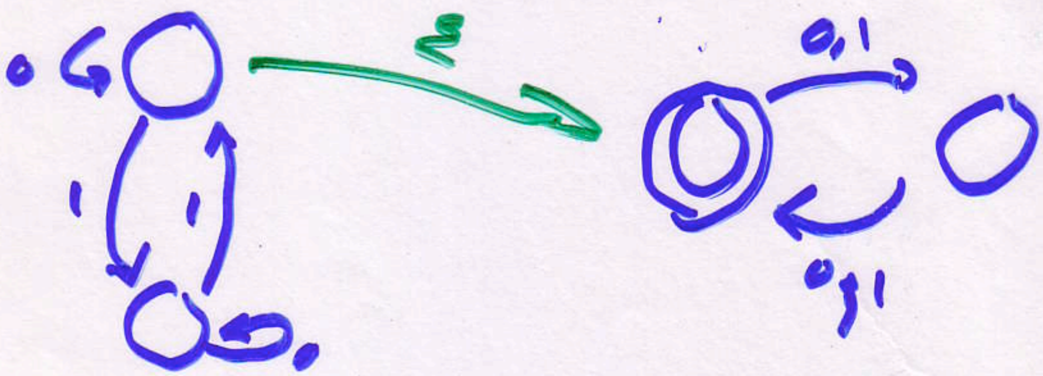
So, reading w, M stays in M_1 a while (reading some prefix of w, call it x) then jumps from some $q \in F_1$ to q_{20}, then runs around in M_2 reading rest of w (call it y) ending in $F_2 = F$.

$\therefore$ $w = xy$ s.t. $x \in L_1$ & $y \in L_2$

$$\boxed{L(M) \subseteq L_1 \cdot L_2}$$

Even Parity

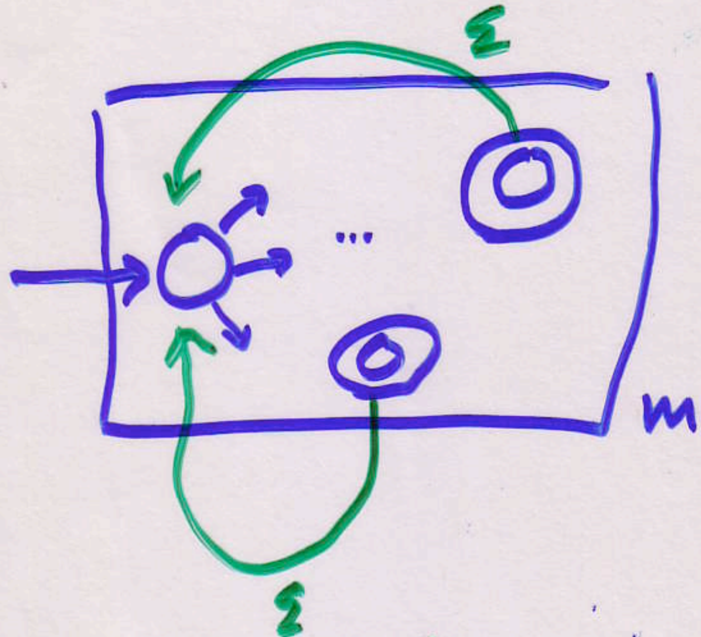
Even length



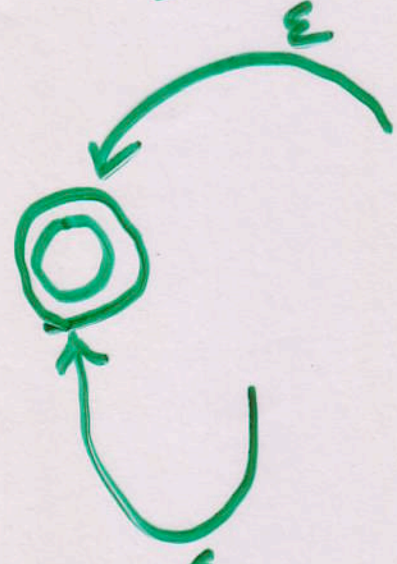
011

01

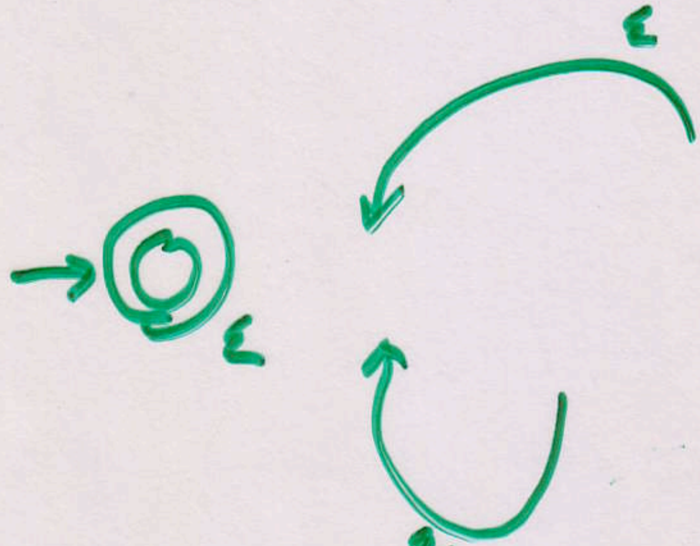
Given NFA M, can build one for $L(M)^*$?



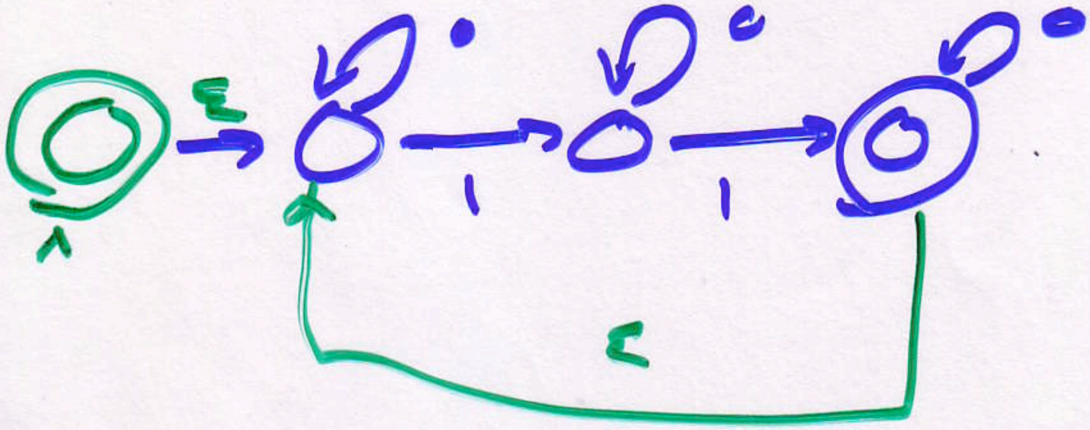
No
(may reject ε)



No
May accept
extra
stuff



<u>Yes!</u>



$$\left(\Sigma^* - \{\varepsilon\}\right)^* = \Sigma^*$$

$$L^{**} \stackrel{?}{=} L^*$$