4.a) Supp there are DFSA's M, M' st $L = \mathcal{L}(M)$, $L' = \mathcal{L}(M')$

$M = (Q, \Sigma, \delta, S, F)$ $M' = (Q', \Sigma', \delta', S', F')$

Let M_1 be a DFSA st:
$Q_1 = Q \times Q' \times \{odd, even\}$
$\delta_1(q_1, q_2, odd) = (\delta(q_1, a), q_2, even)$
$\delta_1(q_1, q_2, even) = (q_1, \delta'(q_2, a), odd)$ $q_1 \in Q$, $q_2 \in Q'$, $a \in \Sigma$
$S_1 = (S, S', odd)$

$F_1 = \{(q_1, q_2, odd), q_1 \in F, q_2 \in F'\}$

Final state is odd index as the last processed state should be a even number bc $\lambda(x, y) = a_1 b_1 \cdots a_n b_n$ so $len(\lambda(x,y)) = 2n$