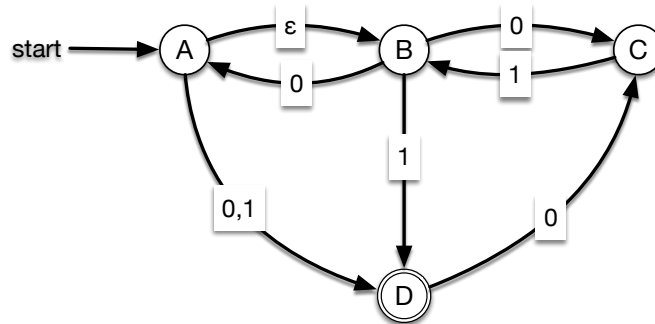# Homework Module 5

(1) Convert the following NFA into a DFA. Give the transition table and the diagram of the NFA.

(2) Solve the recurrence $T(n) = T(\sqrt{n}) + 1$ by substituting $n \leftarrow 2^m$, then $S(m) = T(2^n)$ and applying the master theorem on the recurrence in S:.

(3) Use the Master Theorem — if possible — to solve the following recurrences. In some cases, the recurrence can be solved but the Master Theorem cannot be applied.

1. $T(n) = 3T(n/2) + n \log n$.

2. $T(n) = 4T(n/2) + \sqrt{n} + 2$

3. $T(n) = 2^n T(n/3) + n^2$

4. $T(n) = 3T(n/4) + n \log n$.

5. $T(n) = \frac{1}{2}T(\frac{2}{3}n) + \sqrt{n}$.

6. $T(n) = 2T(n/4) + \sqrt{n} + 2$