1. Sipser text, no. 1.7b,g (2nd edition), 1.5b,f (1st edition).
2. Sipser text, no. 1.8b, 1.9b, 1.10b (2nd edition), 1.6b, 1.7b, 1.8b (1st edition).
3. a. Construct an NFA recognizing the language \( \{ab, aba\}^*\).
b. Convert this NFA to an equivalent DFA. Give only the portion of the DFA reachable from the start state.
5. Please attempt this problem if you had trouble with the Merge Sort problem on homework 1.

Show by induction that the following Quicksort algorithm is correct.

\[
\text{QuickSort}(A, i, j) - \text{sorts the items in array } A[i : j] \\
\text{if } i \geq j \text{ then return} \\
\text{else do} \\
\text{Partition}(A, i, j, k); \\
\text{(* returns index } k, \text{ and rearranges the items in } A[i : j] \text{ so that } A[h] < A[k], \\
\text{for } i \leq h < k, \text{ and } A[k] \leq A[\ell], \text{ for } k < \ell \leq j *) \\
\text{QuickSort}(A, i, k - 1); \\
\text{QuickSort}(A, k + 1, j); \\
\text{end (* else do *)} \\
\text{Use the following induction hypothesis:} \\
\text{QuickSort correctly sorts arrays of fewer than } n \text{ items}
\]

You may assume Partition implements its specification as given above.