1. (60 points) Consider the DFA below.

(a) Construct a two dimensional table where the row and column headers are the states of the above DFA. Mark each cell with a ‘1’ (or a higher number representing the iteration number) if the states are “different.” Unmarked cells will represent indistinguishable states.

(b) Construct a minimized DFA by collapsing (groups of) indistinguishable states into single states.

2. (40 points) Consider the following grammars $G_1$ and $G_2$:

$G_1$:
$S \rightarrow xAx$
$A \rightarrow Aa | Ab | c | d$

$G_2$:
$S \rightarrow xAx$
$A \rightarrow c | d | cB | dB$
$B \rightarrow aB | bB | a | b$

(a) Give a derivation sequence for string $xcabx$ in $G_1$. Give the derivation tree of the sequence.

(b) Give a derivation sequence for string $xcabx$ in $G_2$. Give the derivation tree of the sequence.