

CS 334 – Fall 2004: Answers for Opportunity 3

1. One possible solution:  $S \rightarrow aSaSbS \mid aSbSaS \mid bSaSaS \mid \Lambda$
2.  $\delta(q_0, a, Z_0) = (q_0, aZ_0)$   
 $\delta(q_0, b, Z_0) = (q_0, bZ_0)$   
 $\delta(q_0, a, a) = (q_0, aa)$   
 $\delta(q_0, b, b) = (q_0, bb)$   
 $\delta(q_0, a, b) = (q_0, \Lambda)$   
 $\delta(q_0, b, a) = (q_0, \Lambda)$   
 $\delta(q_0, \Lambda, a) = (q_1, a)$   
 $q_1$  is the only final state in this non-deterministic automaton

Another possibility: a deterministic automaton

3.  $\delta(q_0, a, Z_0) = (q_1, Z_0)$   
 $\delta(q_0, b, Z_0) = (q_0, bZ_0)$   
 $\delta(q_0, a, b) = (q_0, \Lambda)$   
 $\delta(q_0, b, b) = (q_0, bb)$   
 $\delta(q_1, a, Z_0) = (q_1, aZ_0)$   
 $\delta(q_1, b, Z_0) = (q_0, Z_0)$   
 $\delta(q_1, a, a) = (q_1, aa)$   
 $\delta(q_1, b, a) = (q_1, \Lambda)$