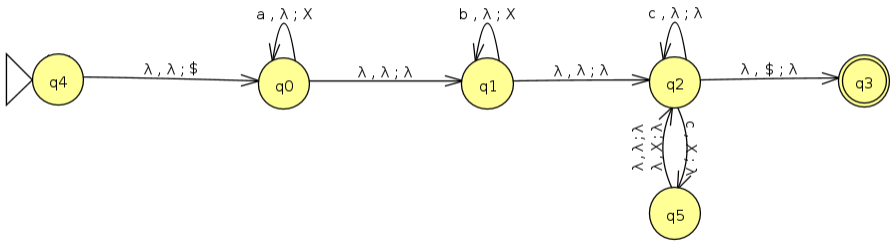
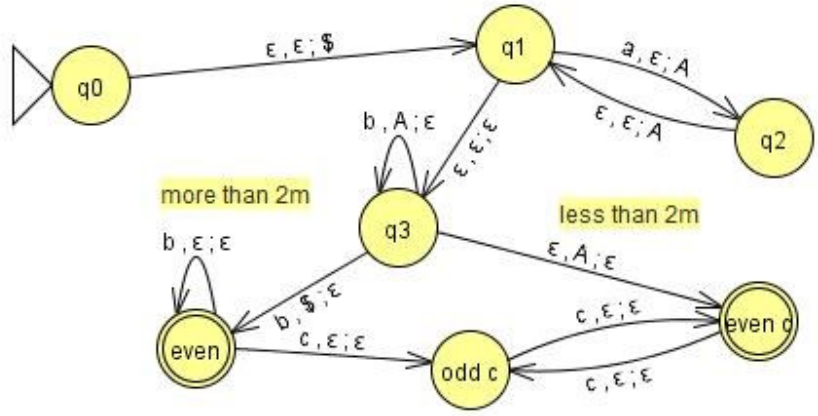
CS 361 – Homework 5 – Answer Key

Total possible points: 60

1. (15 points) Construct a **pushdown automaton** for $A=\{a^n b^m c^i \mid 0 \le n+m \le 2i\}$



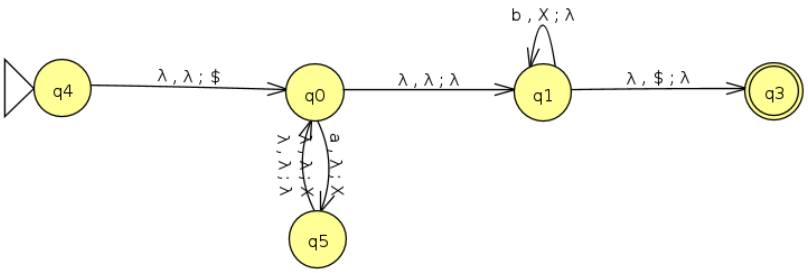
2. (15 points) Design a **pushdown automaton** recognizing $B = \{a^n b^m c^i \mid i, n, m > 0, n \neq 2m, i \text{ is even}\}$.



When n = 2m the transition from q3 on symbol c should have $ on top of the stack, thus we only enable transitions that happens when $n \neq 2m$: b and the top of the stack is $, i.e., $n < 2m$; c and the top of the stack is A or just an A on top of the stack and no c's in the string.

(note that it accepts by final state; no need for empty stack)

3. (15 points) Design a **pushdown automaton** recognizing C= { $a^m b^n$ | m ≥ 0, 2m ≥ n ≥ m}



4. (15 points) Consider the following grammar G:

S→01Sba|A
A→abA10|ϵ |B
B->ccB|ϵ

a. What are the variables of G?

S, A, B

b. What are the terminals of G?

0,1,a,b

c. What is the start variable of G?

S

d. Give 2 strings that are in L(G)

cc,cccc

e. Give 2 strings over the alphabet of G that are not in L(G)

ccc, ccccc

f. True or False: R⇒* 01abcc10ba

true

g. True or False: R⇒* 01baccab10

false

h. True or False: R⇒* 01ccba

true

i. True or False: R⇒* ϵ

true

j. Describe L(G) using set notation, i.e., which types of strings are generated using G

G={$(01)^i(ab)^j(cc)^n(10)^j(ba)^i$ | i >=0, j >=0, n >=0 }