CS 310 Homework #5
Due December 1, 2006
Good luck!

Submit in class:

1. Sipser: 3.1c
2. Sipser 3.2c
3 Sipser 3.8 a,b. This question asks for an "implementation-level description." You need to specify the actions of the tape head (read/write/move) and how the transitions will take place, but not necessarily draw the state diagram. This is similar to how we specified TMs in class without drawing the full state diagram. Just specify, conceptually, how the TM operates. You may check your work in JFLAP but please write (or type) out your solution by hand.

4. Consider the following grammar (Do not alter the grammar in any way):

$S \rightarrow AbC \mid d$
$A \rightarrow aA \mid \varepsilon$
$C \rightarrow Ac$

(a) Calculate FIRST and FOLLOW for the variables in the grammar.

(b) Calculate all entries in the LL(1) parse table. If there are multiple rules for an entry, write all the rules.

Submit JFLAP files:

Please produce a PUNetID_cs310Hmwk5.tar.gz or .zip file containing the following JFLAP files and email it to me before 1pm on Dec 1, 2006:

PUNetID_BinAdd.jff

8-bit binary addition: Produce a 3-tape TM in JFLAP that will produce the sum on tape 3 of the 8-bit binary numbers given on tape 1 and tape 2. For example, if tape 1 contains: 00001111 (15) and tape 2 contains 00000011 (3) the sum on tape 3 should be: 00010010 (18). Don't worry about overflows. Each number on tape 1 and tape 2 will be exactly 8 bits long.

PUNetID_Bin2sComp.jff

8-bit binary complement: Produce a 2 tape TM that will produce the 2s complement on tape 2 of the 8-bit binary number on tape 1. The 2s complement is created by flipping each bit in the number and adding the value 1 to the resulting 8-bit number. For example, the 2s complement of 00001110 is 11110010

EXTRA CREDIT:

PUNetID_BinSub.jff

8-bit binary subtraction: Produce a 3-tape TM that will produce the difference on tape 3 of the 8-bit binary numbers on tape 1 and tape 2. To compute the difference of two binary numbers, you will need to convert the 8-bit binary number on tape 2 to 2s complement and then add this converted number to the number on tape 1. For example: to compute the difference of 00001100 (12) and 00000101 (5), first compute the 2s complement of 5 (11111011). Add this number to 00001100 to produce 00000111 (7).