Computer Science 81, Spring 2007
Assignment 5
Due Wed. Feb. 21
PDAs and CFLs

When page numbers are given, the problems are in the Kozen book.

1. [20 points] Page 336, exercise 85a.

2. [20 points] Page 336, exercise 85f.

3. [20 points] Page 338, exercise 92 (a & b).

4. [20 points] Consider the PDA over input alphabet {0, 1} with the following transition rules:

state	input	pop	next state	push (top at left)
a	ε	s	a	ε
a	0	s	a	0s
a	0	0	a	00
a	1	0	b	ε
b	1	0	b	ε
b	ε	s	b	ε

   The initial state is 'a', and acceptance is by empty stack.

   Convert this PDA into a 1-state PDA using the mechanical conversion technique discussed in class.

   Give examples that support the claim that the new PDA accepts the same language as the original. For example, you could encode your PDA using Pflap. For your convenience, I have included an encoding of the original PDA in the file pflapTest.pl available on the web as example12. (Note that the transition encoding order in pflap.pl is (pop, state, input, push, next-state), which is different from the one given above and the text's.)

5. [20 points] Construct mechanically from the 1-state PDA in problem 4 a context-free grammar that generates the language that the 1-state PDA accepts. (Don't create your own grammar from scratch given knowledge of the language generated; that is not the point.) As in problem 4, give examples that support the claim that the grammar generates the same strings as the PDA accepts.

6. [Extra credit: 35 points] Read Example 23.3 (pp 162-163). Give a pflap encoding of a PDA for the complement language $\{a, b\}^* - \{ww \mid w \in \{a, b\}^*\}$ and show some examples.