There are four problems, A–D, to be handed in. The first two problems are fairly standard pumping lemma problems. On an exam, you may be expected to do such problems quickly and precisely. If you want more practice, then do more problems from the book, or consult the prefect or me.

A. Problem 2.30a (about $0^m1^m0^m1^m$).

B. Problem 2.31 (about palindromes with equal numbers).

This third problem is very difficult, unless you take the hint seriously, in which case it becomes manageable. :)

C. Problem 2.36 (about a pumpable language that isn't context-free).

D. Prove that the intersection of a context-free language and a regular language is a context-free language. (Need a hint? See the back of this page.)

Problem E below is optional.

E. Show that if A is context-free and B is regular, then A/B is context-free. (Need a hint? See the back of this page.)

Here are some hints.

D. How did we prove that the intersection of two regular languages is regular?

E. First, mimic your solution for the previous problem, to make a PDA N based on a PDA P and a DFA M. Then use P and N to construct a PDA for A/B. Various tweaks are required. My solution uses many ϵ-transitions.