ECE G205 Fundamentals of Computer Engineering
Fall 2003

Homework 5: Due by Wednesday October 15 2003

- This test contains 2 problems. They allow you to earn 100 points.

- Show your work, as partial credit can be given. You will be graded not only on the correctness of your answer, but also on the clarity with which you express it. **Be neat**.

- **No late submissions will be accepted.**

- Only homework returned in a 9in × 12in envelope will be accepted. (If you cannot find such envelope, ask the Instructor.) Please, write your name and the class name (ECE G205) on the envelope (write clearly, please).

- For the two problems an e-mail to the TA should be sent that contains the code and the executable of a (single) program that implements the solutions to the problems as functions.

Write your name here: _____

- **Problem # 1 [60 points]**. Suggest how storage for elements can be allocated and deallocated within a hash table by linking all unused slots into a free list. Assume that a slot can store a flag and either one element plus a pointer or two pointers. All dictionary and all list operations should run in $O(1)$ expected time. Does the free list need to be doubly linked, or does a singly linked free list suffice?

- **Problem # 2 [40 points]**. Implement stacks and queues as seen in class in C++ using the C++ Standard Template Library container `vector`. Include tests for underflow and overflow conditions.