

CS 140A - Assignment 1
Linked Lists
Due Tuesday, October 21

In this assignment you will be working with lists. The assignment includes two parts. First you will be writing code to implement a doubly linked list. Then you will use the code in a program that manipulates sets of lists.

Create a doubly linked list class *list* which holds one integer data item. You may implement the doubly linked list in any manner discussed in lecture. The class should also allow the following operations.

Enter (e) Enter a number into the list. The item should be entered into the list such that the list maintains a non-decreasing order.

Print (p) Print out each item in the list in a nicely formatted manner.

Search (s) Search for an item in the list. If the item is found, a pointer to the node in which it was found should be returned, otherwise NULL should be returned.

Size (z) Count and return the number of items in the list.

Remove (r) Remove a node from the list. You should remove only the first node which contains the specified item.

Now write a program that provides the following options.

Create (c) Create a new empty list. You may assume that there is maximum of 5 lists that can be created.

Manipulate (m) Manipulate a list. This should allow the user to choose which list to manipulate and then should be given a list of manipulation options. The manipulation options are the functions described above in the list class (enter, remove, search,...).

Union (u) Create a new list that is the union of two lists. The user should be able to choose the two list from those that have been previously created. The union of two sets includes the items that appear in both sets, without duplicates, for example

$$L1 = \{1, 4, 8, 9\} \quad L2 = \{2, 3, 4, 7, 8, 9\}$$

$$L1 \cup L2 = \{1, 2, 3, 4, 7, 8, 9\}$$

Intersection (i) Create a new list that is the intersection of two lists. The user should be able to choose the two lists from those that have been previously created. The intersection of two sets includes the items from both sets without duplicates, for example

$$L1 = \{1, 4, 8, 9\} \quad L2 = \{2, 3, 4, 7, 8, 9\}$$

$$L1 \cap L2 = \{4, 8, 9\}$$

Submit your program electronically using the instructions provided by the TA. Be sure to use good programming style and include meaningful, thorough comments. Remember that no credit will be given if your program does not compile.