CSE 373 Problem Set 1 Due: April 13, 1998

1. Text, problem 2.2.

2. Using a linear-time algorithm, find the maximum sum of a consecutive subsequence of the sequence $(3, -2, 4, 5, -11, 8, 3, -4, 5, -14, 5)$. Show all your work.

3. In this problem you should carefully define a list oriented recursive merge-sort algorithm. Assume the input data is found in an unsorted linked list. Mergesort should return (destructively) a sorted list containing the elements of the original list. Mergesort first splits the list into two lists of approximately equal size, recursively mergesorts the two lists, then merges the two sorted lists into a single sorted list. You can assume you have already defined a *split* function that returns a *duo* whose *first* field points to a list containing half the elements of the given list, and whose *second* field points to a list containing the remaining elements.

   - First, carefully define *merge*, which takes two sorted lists as arguments and combines them into a single sorted list.
   - Second, define *mergesort* which takes an unsorted list as argument and returns a sorted list containing the same elements.

   Try to make your pseudocode as simple and elegant as possible.

4. Consider an abstract data type which operates on a collection of disjoint sets (two sets are disjoint if they have no element in common) and supports the following two operations:

   (a) Print out the elements of a given set (the order in which the elements are printed does not matter);

   (b) Replace two sets in the collection by their union (the union of sets A and B contains those elements that are in set A or in set B).

   Give the time required to perform these operations in two cases:

   Case 1 Each set is represented by a singly linked linear list;

   Case 2 Each set is represented by a doubly linked circular list.