INFSCI 0020 Program Design and Software Tools  
Homework 2  
Due: By Midnight of Friday September 17, 2004

1. Palindromes (Exercise 4.32) [Points: 30]

A palindrome is a string that is spelled the same way forwards and backwards. Some examples of palindromes are “radar,” “able was i ere i saw elba” and (if blanks are ignored) “a man a plan a canal panama.” Write a recursive function testPalindrome that returns true if the string stored in the array is a palindrome, and false otherwise. The function should ignore spaces and punctuation in the string.

2. Selection Sort (Exercise 4.31)  [Points: Iterative:30; recursive: 30; array of function pointers]

A selection sort searches an array looking for the smallest element in the array. Then, the smallest element is swapped with the first element of the array. The process is repeated for the subarray beginning with the second element of the array. Each pass of the array results in one element being placed in its proper location. This sort performs comparably to the bubble sort—for an array of \( n \) elements, \( n - 1 \) passes must be made, and for each subarray, \( n - 1 \) comparisons must be made to find the smallest value. When the subarray being processed contains one element, the array is sorted.

Write two functions IterSort and RecSort that implement the selection sort algorithm described in 4.31. Function IterSort implements it using iterative approach whereas function RecSort implements it using recursion. In the main program, you should create an array of pointers to the two functions.

For user interface, your program should print the menus as follows:

Menu
[1] Iterative Sort (Generate 10 numbers randomly between 1 and 100)  
[2] Recursive Sort (Generate 10 numbers randomly between 1 and 100)  
[3] Iterative Sort (User inputs 10 numbers between 1 and 100)  
[4] Recursive Sort (User inputs 10 numbers between 1 and 100)

Enter Choice: <user will enter a number between 1 and 4>

If the user chooses a 1 or 2, your program should generate 10 random numbers between 1 and 100. Use srand() function to generate the random numbers - refer to example given in pages 186-189.

If the user inputs choices 3 or 4, the program should ask the user to input 10 numbers that are less than 100 - make sure you catch wrong inputs.

Submission/grading – same as described in the first assignment.