CSE 305: Assignment (5 Questions)

1.

To sort an array A of N elements by the bubblesort method, we proceed as follows:

Pass 1. For $j = 2 \ldots N$, if A[j] < A[$j - 1$] then swap A[j] and A[$j - 1$]. This will place the largest element in position N.

Pass 2. For $j = 2 \ldots N - 1$, if A[j] < A[$j - 1$] then swap A[j] and A[$j - 1$]. This will place the second largest element in position $N - 1$.

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Pass $N - 1$. If A[2] < A[1], then swap A[2] and A[1]. At this point the array is sorted.

Demonstration

initial data	7	5	3	9	1
pass 1	5	3	7	1	9
pass 2	3	5	1	7	9
pass 3	3	1	5	7	9
pass 4	1	3	5	7	9

Write a procedure BUBBLE to sort a byte array by the bubblesort algorithm. The procedure receives the offset address of the array in SI and the number of elements in BX. Write a program that lets the user type a list of single-digit numbers, with one blank between numbers, calls BUBBLE to sort them, and prints the sorted list on the next line.

2.

Use the TEST instruction to do each of the following.

a. Set ZF if the contents of AX is zero.
b. Clear ZF if BX contains an odd number.
c. Set SF if DX contains a negative number.
d. Set ZF if DX contains a zero or positive number.
e. Set PF if BL contains an even number of 1 bits.

3.

Write a program that will prompt the user to enter a hex digit character ("0" . . . "9" or "A" . . . "F"), display it on the next line in decimal, and ask the user if he or she wants to do it again. If the user types "y" or "Y", the program repeats; if the user types anything else, the program terminates. If the user enters an illegal character, prompt the user to try again.

4.

A palindrome is a character string that reads the same forward or backward. In deciding if a string is a palindrome, we ignore blanks, punctuation, and letter case. For example "Madam, I'm Adam" or "A man, a plan, a canal, Panama!"

Write a program that (a) lets the user input a string, (b) prints it forward and backward without punctuation and blanks on successive lines, and (c) decides whether it is a palindrome and prints the conclusion.

5.

The following method can be used to generate random numbers in the range 1 to 32767.

Start with any number in this range.
Shift left once.
Replace bit 0 by the XOR of bits 14 and 15.
Clear bit 15.

Write the following procedures:

a. A procedure READ that lets the user enter a binary number and stores it in AX. You may use the code for binary input given in section 7.4.
b. A procedure RANDOM that receives a number in AX and returns a random number in AX.
c. A procedure WRITE that displays AX in binary. You may use the algorithm given in section 7.4.

Write a program that displays a '?', calls READ to read a binary number, and calls RANDOM and WRITE to compute and display 100 random numbers. The numbers should be displayed four per line, with four blanks separating the numbers.