CS 218
Homework, Asst. #7

Purpose:	Write a simple assembly language program to sort a list of numbers. Learn to use addressing modes, arithmetic operations, and control instructions.
Due:	Thursday (6/16)
Points:	100

Assignment:

Write a simple assembly language program to sort a list of integer numbers into ascending (small to large) order. Additionally, find the minimum, median, maximum, sum, and average of the list. You should find the minimum and maximum after the list is sorted (i.e., min=list[len-1] and max=list[0]).

Note, for an odd number of items, the median value is defined as the middle value. For an even number of values, it is the integer average of the two middle values. The median must be determined *after* the list is sorted.

Use the following cocktail[1] sort algorithm:

```
function cocktailSort(list, listLength) {
    bottom = 0;
    top = list_length - 1;
    swapped = true;

    // if no elements have been swapped, then list is sorted
    while(swapped == true) {
        swapped = false;
        for(i = bottom; i < top; i = i + 1) {
            // test if two elements are in the correct order
            if(list[i] > list[i + 1]) {
                swap(list[i], list[i + 1]);   // out of order -> change places
                swapped = true;
            }
        }

        // decreases `top` because the element with the largest value in the
        // unsorted part of the list is now on the position top
        top = top - 1;
        for(i = top; i > bottom; i = i – 1) {
            if(list[i] < list[i – 1]) {
                swap(list[i], list[i - 1]);
                swapped = true;
            }
        }

        // increases `bottom` because element with the smallest value in the
        // unsorted part of the list is now on the position bottom
        bottom = bottom + 1;
    }
}
```

You ***must*** use the above cocktail sort algorithm above (i.e., do **not** use other sorts).
Note, the algorithm assumes array index's start at 0.

1 Source of Cocktail sort algorithm: http://en.wikipedia.org/wiki/Cocktail_sort

Submission:
When complete, submit:

- *A copy of the **source file** via the class web page (assignment submission link). Assignments received after the start time of class will not be accepted.*
- ***Submissions not based on the full/complete cocktail sort algorithm will not be scored.***

Data Declarations:
All data should be treated as *unsigned* integers (MUL and DIV instructions, but not the CDQ instruction).

Declare the follow data:

```
lst         dd      123,  42, 146,  76, 120,  56, 164,  65, 155,  57
            dd      111, 188,  33,  05,  27, 101, 115, 108,  13, 115
            dd       17,  26, 129, 117, 107, 105, 109,  30, 150,  14
            dd      147, 123,  45,  40,  65,  11,  54,  28,  13,  22
            dd       69,  26,  71, 147,  28,  27,  90, 177,  75,  14
            dd      181,  25,  15,  22,  17,  11,  10, 129,  12, 134
            dd       61,  34, 151,  32,  12,  29, 114,  22,  13, 131
            dd      127,  64,  40, 172,  24, 125,  16,  62,   8,  92
            dd      111, 183, 133,  50,   2,  19,  15,  18, 113,  15
            dd       29, 126,  62,  17, 127,  77,  89,  79,  75,  14
            dd      114,  25,  84,  43,  76, 134,  26, 100,  56,  63
            dd       24,  16,  17, 183,  12,  81, 320,  67,  59, 190
            dd      193, 132, 146, 186, 191, 186, 134, 125,  15,  76
            dd       67, 183,   7, 114,  15,  11,  24, 128, 113, 112
            dd       24,  16,  17, 183,  12, 121, 320,  40,  19,  90
            dd      135, 126, 122, 117, 127,  27,  19, 127, 125, 184
            dd       97,  74, 190,   3,  24, 125, 116, 126,   4,  29
            dd      104, 124, 112, 143, 176,  34, 126, 112, 156, 103
            dd       69,  26,  71, 147,  28,  27,  39, 177,  75,  14
            dd      153, 172, 146, 176, 170, 156, 164, 165, 155, 156
            dd       94,  25,  84,  43,  76,  34,  26,  13,  56,  63
            dd      147, 153, 143, 140, 165, 191, 154, 168, 143, 162
            dd       11,  83, 133,  50,  25,  21,  15,  88,  13,  15
            dd      169, 146, 162, 147, 157, 167, 169, 177, 175, 144
            dd       27,  64,  30, 172,  24,  25,  16,  62,  28,  92
            dd      181, 155, 145, 132, 167, 185, 150, 149, 182,  34
            dd       81,  25,  15,   9,  17,  25,  37, 129,  12, 134
            dd      177, 164, 160, 172, 184, 175, 166,  62, 158,  72
            dd       61,  83, 133, 150, 135,  31, 185, 178, 197, 185
            dd      147, 123,  45,  40,  66,  11,  54,  28,  13,  22
            dd       49,   6, 162, 167, 167, 177, 169, 177, 175, 164
            dd      161, 122, 151,  32,  70,  29,  14,  22,  13, 131
            dd       84, 179, 117, 183, 190, 100, 112, 123, 122, 131
            dd      123,  42, 146,  76,  20,  56,  64,  66, 155,  57
            dd       39, 126,  62,  41, 127,  77, 199,  79, 175,  14

len         dd      350

min         dd      0
med         dd      0
max         dd      0
sum         dd      0
avg         dd      0
```