Name:_____

Homework #7 Computer Organization
Due: Nov. 1, 2014 (Sat.) by 11:59 PM

Write a MIPS assembly language program to sort an array using bubble sort. Your `.data` section for the array values should be:

```
          .data
array:    .word 20, 30, 10, 40, 50, 60, 30, 25, 10, 5
length:   .word 10

          .text
          .globl main
main:
          # MIPS Assembly language program here


          li $v0, 10     # system call to exit the program
          syscall
```

The high-level language algorithm for bubble sort is:

```
for lastUnsortedIndex = (length-1) downto 1 do
     for testIndex = 0 to lastUnsortedIndex-1 do
          if array[testIndex] > array[testIndex + 1] then
               temp = array[testIndex]
               array[testIndex] = array[testIndex + 1]
               array[testIndex + 1] = temp
          end if
     end for testIndex
end for lastUnsortedIndex
```

Extra Credit: Implement the bubble sort algorithm by "walking pointers".

You can download the MIPS simulator at: http://sourceforge.net/projects/spimsimulator/files/
For Window's OS, you will want the QtSpim_9.1.12_Windows.exe

You should submit your homework via the Internet by following the directions at:
http://www.cs.uni.edu/~fienup/cs1410f14/homework/submissionDirections.htm

Basically, you put the following files in a `hw7` folder and zip the folder to create a `hw7.zip` file (made on Windows by right-clicking on the `hw7` folder and selecting `Send to|Compressed (zipped) folder`) containing:

- the MIPS assembly language program, e.g., hw7.s from any text-editor (e.g., WordPad)
- a window capture of the **QtSpim simulator after running your assembly language program** with array values above. Make sure the sorted array values are visible in the data section of the screen capture. (You can capture this window by (1) right-clicking anywhere in the window to make it the "currently active" window, (2) while holding down the <Alt> key, press the <PrtScn> key to capture the window into the Window's clipboard, and (3) open some word processor (Word, Open Office, etc.) and paste the image into the document. Add your name to this document before printing it.)

On the top of the "directions" web-page above is a link to the submission tool (https://math-cs.cns.uni.edu/~schafer/submit/which_course.cgi). You'll need to enter your CatID username and password when requested.