CS 351 - Assignment #1

Due Date: 19.11.2016, Saturday, 23:59

Assignment Submission

Turn in your assignment by the due date through LMS.
No late submissions will be accepted.
For each question, you should create a file and name the file as answer`<question_number>.asm`.
Put all files under a folder (name the folder as `<your_first_name>_<your_last_name>_assignment1)`.
Zip this folder and upload the zip file to LMS.
Name the zip file as `<first_name>_<your_last_name>_assignment1`.

All work in the questions must be your own; you must neither copy from nor provide assistance to anybody else. If you need guidance for any question, talk to the instructor or teaching assistant.

In this assignment, you will write and simulate MIPS assembly code to solve various problems. You are going to use MARS MIPS simulator. Please download and install MARS version 4.5 from the following link:
`http://courses.missouristate.edu/KenVollmar/MARS/`
In order to run your code, you should first assemble it via clicking RunAssemble (or press F3) then you can run by clicking this symbol

in the toolbar.

Question 1 (40 pts)

You are given the following Python code. Please write the corresponding MIPS assembly code. In your MIPS code, hold the value of the variable x in register `$t0`, the value of the variable y in register `$t1` and the value of the variable sum in register `$s0`.

```
sum = 0
for x in range(1,10,2):
    y = 0
    while y <= x:
        sum += y
        y += 1
```

Question 2 (40 pts)

Assume that a list A (array A) of integer numbers (each integer is 4-bytes) have been stored in memory (in consecutive memory locations). MIPS register `$s0` holds the base address of this list and register `$s1` stores the size of the array. Please write a MIPS assembly code that finds the mean (average) and difference of farthest pair (max-min) of the list.

In your MIPS code, hold the value of the mean in register `$s2`, the value of the difference of farthest pair (max-min) in register `$s3`.

Note: For this question, start with the code (answer2.asm) that has been provided to you with the assignment. This code defines a list, stores the base address of the list to the register `$s0` and the size of the list to the register `$s1`.

Question 3 (20 pts)

Assume that a list A (array A) of integer numbers (each integer is 4-bytes) have been stored in memory (in consecutive memory locations) like in the second question. MIPS register `$s0` holds the base address of this list and register `$s1` stores the size of the array. Please write a MIPS assembly code that finds the median of the list.

To be able to find the median of the list, you should sort the list. Following python code is the implementation of SelectionSort algorithm. Please write MIPS assembly code for SelectionSort, then find the median of the list, median of the list `A[length_of_A/2]` after sorting the list A.

```
my_array = [10,9,2,3,1,4,6,7,32]
length_of_array = len(my_array)

i = 0
while i < length_of_array:
    j = i
    temp_minimum_index = j
    while j < length_of_array:
        if my_array[j] < my_array[temp_minimum_index]:
            temp_minimum_index = j
        j += 1
    temporary_value = my_array[i]
    my_array[i] = my_array[temp_minimum_index]
    my_array[temp_minimum_index] = temporary_value
    i += 1
```

In your MIPS code, hold the value of `i` in register `$t0`, the value of `j` in register `$t1`, the value of `temp_mininum_index` in register `$t2`, the value of `temporary_value` in register `$t3` and the value of the median in register `$s2`.

Note: For this question, start with the code (answer3.asm) that has been provided to you with the assignment. This code defines a list, stores the base address of the list to the register `$s0` and the size of the list to the register `$s1`.