

Homework #4
CSCE 2610: Assembly Language and Computer Organization
Spring 2016

100 Points

Due: 10:00 PM on Wednesday March 2nd, 2016

Instructions: Write MIPS assembly program for the following questions. Using MARS SPIM simulator, assemble and run the program. Comment your code before uploading it to the Blackboard. Do not convert the .asm files into PDF. Do not create an archive (zip/tar/rar) file for your submission. Upload it to blackboard on or before the due date and time. **Late submissions are not allowed.**

Hint: Write C/C++ program first, then translate it into MIPS. Make sure your C/C++ program runs successfully!

1. Implement a bubble sort which sorts an integer array with 10 elements. Ask the user to enter 10 values. The values can be positive or negative integers. Implement 3 functions: main, sort and swap. Refer to slides 59-63. Use the codes available in those slides. **[15 points]**

2. The Fibonacci numbers are the numbers in the following integer sequence.

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 141, ...

In mathematical terms, the sequence F_n of Fibonacci numbers is defined by the recurrence relation

$$F_n = F_{n-1} + F_{n-2}$$

with seed values

$$F_0 = 0 \text{ and } F_1 = 1$$

Write a recursive program that displays F_n . For example, if $n = 0$, then the program should display 0. If $n = 1$, then it should display 1. For $n > 1$, it should return $F_{n-1} + F_{n-2}$. Ask the user to enter the n value. Assume the n value will be a positive integer and less than or equal to 25. **[50 points]**

3. Write a simple loop program which prints star patterns. Ask the user to enter a positive number. For example:

If the user enters 3, print the following star pattern,

```
  *
 * *
* * *
```

If the user enters 5, print the following star pattern,

```
    *
   * *
  * * *
 * * * *
* * * * *
```

[35 points]