Problem Set #5

CSEE 3827: Fundamentals of Computer Systems

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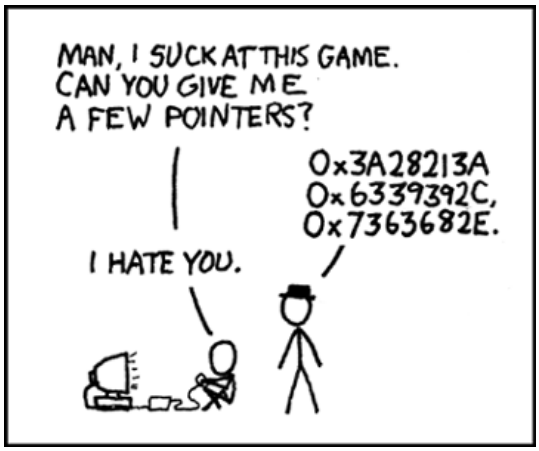

- For each function, place all of your code above the line in the scaffolding that begins

```
#### Do not remove this separator. ...
```

- We will test your code using the main function in the scaffolding.
- We will also test that your code adheres to calling conventions by calling it from other versions of main that have different register usage (but adhere to conventions). Your function should also adhere to calling conventions.
- To submit, you should upload three files named rfib.s, llsum.s and bubble.s to gradescope.

1. **`rfib`** Write a **recursive** function in MIPS that takes one integer argument and returns the Fibonacci number corresponding to that argument:

   ```
   rfib(0) = 0
   rfib(1) = 1
   rfib(2) = 1
   rfib(3) = 2
   rfib(4) = 3
   ```
   and so on.

   Your code should handle non-negative integer argument values, including zero. No need to error check for negative arguments. The function should adhere to all calling conventions, so the argument will be passed to `rfib` in $a0 and should be returned from `rfib` in $v0.

2. **`llsum()`** Write a **recursive** function to sum the cells in a linked list. The linked list sum function takes one argument, a pointer to the first cell in a linked list, and should return the sum of all of the cells in the list.

   The list resides in memory, and each cell is 8B in size. The first 4B is an integer containing the value of the cell. The second 4B is a pointer to the next cell in the linked list. The last cell in the list has a null next pointer (i.e., next pointer = 0). Cell values may be positive or negative.

3. **`bubble()`** Write a function that uses bubble sort[1] to sort an array of integers in memory. Your function, called `bubble`, should take two inputs:

   - a pointer to an array of integers in memory
   - the number of integers in the array to be sorted

   `bubble` has no return value, but after execution, the integers in the array should be rearranged to be ordered from smallest to largest.

[1] https://en.wikipedia.org/wiki/Bubble_sort