COMP.2030 Homework 3

Consider a linear search program in C on the right.

```
void main() {
    int X[];
    int key = 5;
    index = search();
    print("%d", index);
}

int search(){
    int i = 0;
    int found = 0;
    while (!found && X[i] != 0) {
        if (X[i] == key) {
          found = 1;
        } else {
          i++;
        }
    }
    if (found) {
        return i;
    } else {
        return -1;
    }
}
```

Assume array, X, contains only positive integers greater than 0 (you can initialize X with arbitrary values in MIPS). The last value in X is set to 0 to mark the end of the array.

In C, we would pass an argument to `search()` to assign the value of 'key', but it can be considered global, as it will be stored in a register to be used within `search()`.

1. Write an "assembly" pseudo-C version of the C program on the right (consult homework 1 for help).

2. Write MIPS code from the pseudo-C code in part (1).

3. Implement the MIPS code in part (2) in MARS. You can include an arbitrary array X, and initialize the key value in a register.

Review the grading policy for assembly homework (on next page) before beginning part (3).

What to submit:

Include the following two in **a SINGLE text file** (your_last_name.txt or your_last_name,docx):

1. Your pseudo-C code in part (1).
2. MIPS code in part (3) with comments (copy the code from MARS and paste into the text file).

Assembly homework will be graded according to the following criteria:

Correctness of execution (70%), Comments (30%).

- Comments are critically important, and comments will be graded.
  - Each function must be preceded by comments, including the name of the function, the arguments used and the registers they are stored in, and how the return value is passed.
  - Each line of MIPS instruction is typically commented on the right in a short C-like statement, so that comments on the right provide enough info on the flow of the function.
- Don't just copy/paste and submit the incomplete homework code from class. That's essentially not doing anything and will be given a 0.
- Read the homework assignments carefully. If you miss any of the requirements, points will be taken off (yes, even if it compiles fine).
- As always, no plagiarizing. Remember the university policy on academic integrity.

Working with your classmates on homework is fine, as long as you write your code. Copying someone elses code, or letting someone counting your code counts as plagiarizing. As such, please make sure all your work that you have completed is written by you and you alone. The logic and reasoning can be similar, but not the code itself. I understand if certain sections can only be written in one way, but it does look very fishy if two homework submissions look exactly the same. Please write the names of the people you worked with on the top comment of the code to clear up any confusion.