COMP3350 Spring, 2024
Lab 2

Important Notes:

- There will be two submitted **assembly language files (.asm file)**. The **code** must be accompanied by adequate comments. Writing only the code could lead to **zero** credits.
- The submitted **lab report** should be **a single PDF file** unless otherwise mentioned. Texts of the reports are expected to be typed in for which you could use software programs like LaTeX, Microsoft Word etc. All screenshots (if any) should be included in this PDF file, clearly titled, and accompanied with adequate descriptions.
- The PDF file should be clearly formatted to help the TA/instructor to locate the answer to each corresponding question. If the student fails to label the answers with reasonable efforts or submit files with poor readability, the submission may only receive zero or partial score.
- Please use the following naming conventions for your submitted files.
    - Lab2task1.asm
    - Lab2task2.asm
    - Lab2report.pdf
- Students are encouraged to complete each task with best efforts. Even if the final outcome isn't fully correct, partial credit may be awarded if the instructor and TA recognize that the student demonstrates a certain level of understanding.
- Solutions turned in must be your own. Please, mention references (if any) at the end of each question.

Please Complete the Following Tasks.

Task 1 (50 points) Please translate the following C code segment into MIPS to do insertion sort. You may use any MIPS instructions that you've learned inside or outside of class.

```
int main() {
        int i, j, v;
        int A[12] = {21, 50, 63, 72, 0, 95, 11, 28, 4, 5, 16, 7};
        for (i = 1; i < 12; ++i) {
                v = A[i];
                for (j = i - 1; j >= 0 && A[j] >= v; --j) {
                        A[j+1] = A[j];
                }
        A[j+ 1] = v;
        }
return 0;
}
```

Task 2 (50 points) Please translate the following C code segment into MIPS to do insertion sort using procedures. You may use any MIPS instructions that you've learned inside or outside of class.

```
void swap(int v[], int k) {
        int temp;
        temp = v[k];
        v[k] = v[k+1];
        v[k+1] = temp;
}

void sort (int v[], int n) {
        int i, j;
        for (i = 0; i < n; i += 1) {
                for (j = i – 1; j >= 0 && v[j] > v[j + 1]; j--) {
                        swap(v,j);
                }
        }
}

int main() {
        int A[10] = {7, 42, 0, 27, 16, 8, 4, 15, 31, 45};
        sort(A, 10);
        return 0;
}
```

Grading Criteria:

In both tasks, your lab report and comments should clearly explain the steps of how you translate the above C programs into MIPS.

Task 1: Properly initializing and using registers (5 points). Proper understanding and usage of branches (5 points). Correct logic (5 points) and implementation (5 points) of the outer loop. Correct logic (5 points) and implementation (5 points) of the inner loop. The submitted file with the entire program should run in MARS and provide correct outputs (Please print the values in the console or use screenshots to clearly show that your program provides the correct outputs) (10 points). Comments for each part of the program (5 points). Adequate explanation of your steps in your lab report which is a formatted pdf file (5 points).

Task 2: Properly initializing and using registers (5 points). Proper understanding and usage of branches (5 points). Correct logic (5 points) and implementation (5 points) of the sort procedure. Correct logic (5 points) and implementation (5 points) of the swap procedure. The submitted file with the entire program should run in MARS and provide correct outputs (Please print the values in the console or use screenshots to clearly show that your program provides the correct outputs) (10 points). Comments for each part of the program (5 points). Adequate explanation of your steps in your lab report which is a formatted pdf file (5 points).