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**Notes:**

- Students are requested to submit the MIPS program(s)/source code **and** report (in pdf) to the elearning no later than 10-January-2021. All files need to be compressed into one .zip file before submitting.
  - Compress all of your files (code, reports) with the following name  
    < Group >\_<Name of any member of your group>
    - Where <Group> is your staying class (CCC01, CC02, CC03 or CC04).
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**Question 1.** Given the following MIPS declaration in the data section of a MIPS program

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```
.data
nums .word <an integer number>
elems .word <array elements>
```

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Where <an integer number> will store the number of elements in the array elems. elems is an array that stores integer elements whose size is equal to value <an integer number>. You are required to choose those values when developing and testing your program.

1. Write a MIPS program that sort the the array elems in **ascending order** using the **bubble sort** algorithm. (2 points)
2. Calculate the execution time of your program if one instruction requires 1 ns for processing. (1 point)

**Question 2.** Given the following C code

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```
struct Students {
    unsigned int id;
    char name[25];
    unsigned int age:7;
    unsigned int is_male:1;
    float average_score;
} student[5];

void print_student(int std_idx){
    char genre[] = "Male\0|Female";
    printf("Student id: %u\n", student[std_idx].id);
    printf("Student name: %s\n", student[std_idx].name);
    printf("Student age: %u\n", student[std_idx].age);
    printf("Student gender: %s\n", &genre[student[std_idx].is_male==1? 0: 6]);
    printf("Student id: %f\n\n", student[std_idx].average_score);
}

void main(int n) {
    int i;
    printf("This is a list of students\n");
    /* Assign information for list of students */
    for (i = 0; i < 5; i = i + 1) print_student(i);
}
```

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You are required to finish the following requirements:

1. Organize memory allocation for the **Students struct** (padding is required). (*2 points*)
2. Initialize the array of 5 students. Assign any value for their information on the main program. (Be careful that the assigned value do not exceed the range of variables). (*1 points*)
3. Write a MIPS program for print\_student procedure. (*2 points*)
4. Use print\_student procedure to print information of 5 assigned students. (*2 points*)

—————the end—————