Informatics II
Exercise 1

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Goal:

- Declare, initialize and use C data type: char, integer.
- Declare, initialize and use one-dimensional array and 2-dimensional array in C.
- Write for-loop in C and, *printf* function.
- Implement selection sorting algorithm in C.

Introduction to C

Task 1. Reverse String Write a C program with a function `void reverse(char s[])` that reverses and prints a given string. Assume that all strings are at most 1000 characters long. Your program should prompt the user for an input string, read the string (terminated by a new line), and print the reversed string to the screen. Do not use any built-in library functions in this task. An input/output example is illustrated below (input is typeset in bold):

```
Please enter a string to reverse: Hello World!
Result string: !dlroW olleH
```

Hint: Do not forget to add the termination character at the end of your reversed string!

Task 2. Perfect Square Number A *perfect square number* is an integer that is the square of another integer. Write a C function with a loop `bool isPerfectSquare(int num)` that determines whether an integer is a perfect square number or not. Your program should prompt the user to type in an integer. After an integer is typed in, your program prints "TRUE" if it is a perfect square number, otherwise, "FALSE". Do not use any built-in library functions in this task Two input/output examples are illustrated below (input is typeset in bold):

```
Enter an integer: 25
Perfect Squre Number: TRUE
```

```
Enter an integer: 37
Perfect Squre Number: FALSE
```

Note: Note that `0` and `1` is also a perfect square number.
When you finish your program, think about if it is possible to lower the loop times in your program.

Task 3. Matrix Multiplication. A matrix of integers is a 2-dimensional array of integers in C. Given two matrices A and B, write a C program to calculate the result of matrix multiplication of A and B. Assume that both A and B are 3×3 2-dimensional C arrays. Your program should initialize a 2-dimensional matrix (with any integers you like), calculate the matrix multiplication and print the result row by row. You can verify your result with calculators or any tools.

Sorting

Task 4. Selection Sort in Ascending and Descending Order Write a program in C that reads an array `A[0...n-1]` with `n` integers and implements two functions `void ascSelectionSort(int A[], int n)` and `void descSelectionSort(int A[], int n)`. These function should print the sorted array with ascending or descending respectively. Two input/output examples is illustrated below (input is typeset in bold):

Values of A separated by spaces (non-number to stop): **2 10 3 22 15 12 end**
Ascending Order: 2 3 10 12 15 22
Descending Order: 22 15 12 10 3 2

Values of A separated by spaces (non-number to stop): **2 2 3 10 15 12 12 8 9 5 4 end**
Ascending Order: 2 2 3 4 5 8 9 10 12 12 15
Descending Order: 15 12 12 10 9 8 5 4 3 2 2