

# CS2022 ASSIGNMENT 12 (Due Date: Dec 9, 2022)

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**Instructions:** You have to answer all of them.

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## Question 1

Program A and Program B are two simple programs to let you understand how a C program handles the data (equivalently variables) to be used in the program. For both programs, three data have been declared, namely SNM, SNA and Choice. In Program A, the data type of SNM and SNA are declared as integer while the data type of Choice is declared as character. In Program B, all three data are declared as integer data type. The purpose of this declaration is to let the operating system to allocate sufficient working space for these data for running this program.

Suppose both programs have been compiled successfully. Once the program A has been invoked, the following output will be shown on the screen. (Note that the output on the first line might be different from different computers and compilers.)

```
SNM = 0, SNA = 1, Choice = .
SNM = 45, SNA = 35, Choice = .
Which course you would like to register?
a: Marketing, b: Accounting
Please enter your choice (a or b):
```

Then, the user has to enter his/her option. Suppose the user has entered 'a'. The following output will be shown on the screen.

```
SNM = 0, SNA = 1, Choice = .
SNM = 45, SNA = 35, Choice = .
Which course you would like to register?
a: Marketing, b: Accounting
Please enter your choice (a or b): a
You have successfully registered Marketing.
You are now the number 46 student.
SNM = 46, SNA = 35, Choice = a.
```

Now, you need to edit both programs in a C compiler and compile them. Once they have been compiled successfully, run the programs and answer the following questions.

- (a) For Program A, what will you see if the option is 'b'? Cut and paste the output in your answer file.

- (b) For Program A, what will you see if the option is 'c'? Cut and paste the output in your answer file.

- (c) For Program B, what will you see if the option is '1'? Cut and paste the output in your answer file.

- (d) For Program B, what will you see if the option is '2'? Cut and paste the output in your answer file.

- (e) For Program B, what will you see if the option is 'a'? Cut and paste the output in your answer file.

- (f) For Program B, what will you see if the option is '-1'? Cut and paste the output in your answer file.

One purpose of these questions is let you realize how the data are initialized.

## Question 2

Program C is a slightly modification of Program A. Instead of declaring SNM and SNA as integer data type, they are now declared as float data type. By that, displaying the corresponding numbers are now specified by `%.2f` instead of `%d`.

- (a) What will you see if the option is 'a'? Cut and paste the output in your answer file.

- (b) What will you see if the option is 'c'? Cut and paste the output in your answer file.

- (c) What will you see if the initial setting of SNM is 45.1103 and the option is 'a'? Cut and paste the output in your answer file.

- (d) What will you see if the initial setting of SNM is 45.1167 and the option is 'a'? Cut and paste the output in your answer file.

- (e) Based upon the results in (c) and (d), what is the rounding method applied in `%.2f`?

### Question 3

- (a) In Program A, what will be the output if we make the following change on the *scanf()* command?

```
scanf("%c", &Choice);
```

is changed to

```
scanf("%c", Choice);
```

- (b) In Program A, what will be the output if we make the following change on the declaration of SNM?

```
int SNM;
```

is changed to

```
float SNM;
```

The rest of the codes are kept the same.

### Question 4

Program D and Program E are sample programs showing how numbers are entered. In Program D, the numbers are declared as integer data type while the numbers in Program E are declared as float data type. You need to edit both programs in a C compiler and compile them. Once they have been compiled successfully, run the programs and answer the following questions.

- (a) For Program D, what is the output of if the first number is 99 and the other number is 101?
- (b) For Program E, what is the output of if the first number is 99 and the other number is 101?
- (c) For Program D, what is the output of if the first number is 99.99 and the other number is 101.11?
- (d) For Program E, what is the output of if the first number is 99.99 and the other number is 101.11?

### Question 5

- (a) With reference to Program D or Program E, write a C program which (i) is able to ask the user to enter 5 numbers and then (ii) display to the users the numbers he/she has entered.
- (b) With reference to Program D or Program E, write a C program which (i) will ask the user how many numbers to be entered, (ii) ask the user to enter 5 numbers and then (iii) display to the users the numbers he/she has entered.

## Program A

```
#include<stdio.h>

main() /* Main function. */
{
    int SNM; /* Current no. of students in Marketing. */
    int SNA; /* Current no. of students in Accounting. */
    char Choice; /* Define a character variable Choice. */

    printf("SNM = %d, SNA = %d, Choice = %c.\n", SNM, SNA, Choice);
    SNM = 45; SNA = 35;
    printf("SNM = %d, SNA = %d, Choice = %c.\n", SNM, SNA, Choice);
    printf("Which course you would like to register?\n");
    printf("a: Marketing, b: Accounting\n");
    printf("Please enter your choice (a or b): ");
    scanf("%c", &Choice);

    if (Choice == 'a')
    {
        SNM = SNM + 1;
        printf("You have successfully registered Marketing.\n");
        printf("You are now the number %d student.\n", SNM);
    }
    else
    {
        SNA = SNA + 1;
        printf("You have successfully registered Accounting.\n");
        printf("You are now the number %d student.\n", SNA);
    }

    printf("SNM = %d, SNA = %d, Choice = %c.", SNM, SNA, Choice);
}
}
```

## Program B

```
#include<stdio.h>

main() /* Main function. */
{
    int SNM; /* Current no. of students in Marketing. */
    int SNA; /* Current no. of students in Accounting. */
    int Choice; /* Define a character variable Choice. */

    printf("SNM = %d, SNA = %d, Choice = %d.\n", SNM, SNA, Choice);
    SNM = 45; SNA = 35;
    printf("SNM = %d, SNA = %d, Choice = %d.\n", SNM, SNA, Choice);
    printf("Which course you would like to register?\n");
    printf("1: Marketing, 2: Accounting\n");
    printf("Please enter your choice (1 or 2): ");
    scanf("%d", &Choice);

    if (Choice == 1)
    {
        SNM = SNM + 1;
        printf("You have successfully registered Marketing.\n");
        printf("You are now the number %d student.", SNM);
    }
    else
    {
        SNA = SNA + 1;
        printf("You have successfully registered Accounting.\n");
        printf("You are now the number %d student.", SNA);
    }

    printf("SNM = %d, SNA = %d, Choice = %d.", SNM, SNA, Choice);
}
}
```

## Program C

```
#include<stdio.h>

main() /* Main function. */
{
    float SNM; /* Current no. of students in Marketing. */
    float SNA; /* Current no. of students in Accounting. */
    char Choice; /* Define a character variable Choice. */

    printf("SNM = %.2f, SNA = %.2f, Choice = %c.\n", SNM, SNA, Choice);
    SNM = 45; SNA = 35;
    printf("SNM = %.2f, SNA = %.2f, Choice = %c.\n", SNM, SNA, Choice);
    printf("Which course you would like to register?\n");
    printf("a: Marketing, b: Accounting\n");
    printf("Please enter your choice (a or b): ");
    scanf("%c", &Choice);

    if (Choice == 'a')
    {
        SNM = SNM + 1;
        printf("You have successfully registered Marketing.\n");
        printf("You are now the number %d student in the class.\n", SNM);
    }
    else
    {
        SNA = SNA + 1;
        printf("You have successfully registered Accounting.\n");
        printf("You are now the number %d student in the class.\n", SNA);
    }
    printf("SNM = %.2f, SNA = %.2f, Choice = %c.", SNM, SNA, Choice);
}
}
```

## Program D

```
#include<stdio.h>

main()
{
int A[2];

printf("A[0] = %d, A[1] = %d.\n", A[0], A[1]);

printf("Input the 1st number: ");
scanf("%d", &A[0]);
printf("A[0] = %d, A[1] = %d.\n", A[0], A[1]);

printf("Input the 2nd number: ");
scanf("%d", &A[1]);
printf("A[0] = %d, A[1] = %d.\n", A[0], A[1]);
}
```

## Program E

```
#include<stdio.h>

main()
{
float A[2];

printf("A[0] = %f, A[1] = %f.\n", A[0], A[1]);

printf("Input the 1st number: ");
scanf("%d", &A[0]);
printf("A[0] = %f, A[1] = %f.\n", A[0], A[1]);

printf("Input the 2nd number: ");
scanf("%d", &A[1]);
printf("A[0] = %f, A[1] = %f.\n", A[0], A[1]);
}
```