Quiz #3

[CS 120] High-level Programming I: The C Programming Language

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Notes: This is a short-answer, closed books quiz. Do not collaborate or copy other people's work. Please write legibly – I can give points only for correct, clear answers I am able to read.

1. Implement code

Assume that in your program there are the following variable declarations:

```
1  float f;
2  float fs[4];
```

Assume that every task in the exercise is dependent on tasks above it in their specific order. Write the following declarations and code snippets, and answer the questions: *(60 marks total)*

a) Define a new variable `f_ptr` as a pointer to a variable of a type float, and initialize it to a value that is not an address of a currently existing object *(5 marks)*:

```
float * f_ptr = 7.5;
```

-3 -3 NULL `float* f_ptr = NULL;`

b) Define a new variable `f2_ptr` as a pointer to a variable of a type float, and initialize it to a value that is an address of a variable `f` *(5 marks)*:

```
float * f2_ptr = &f;
```

c) Write an expression that lets the program to assign a new value (a float literal of your choice) to a variable `f` via pointer `f2_ptr` *(5 marks)*:

```
*f2_ptr = 2.5f;
```

-1 ← double literal (-1)

d) Write an expression that lets the program print the value of a variable `f` via pointer `f2_ptr` to the console output *(5 marks)*:

```
printf("value of variable f is %f :", *f2_ptr)
```

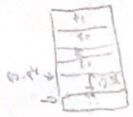
-2 (-2)

e) Answer what is now the result of the expression (`f2_ptr + 1`) and whether it points to a valid object in memory *(10 marks)*:

(f2_ptr + 1) is a null pointer. No, it is not! (-5)

-5

It does not point to a valid object in memory. ✓



f) Write an expression that assigns to a pointer `f2_ptr` an address of the second (index: 1) element of the array `fs` (you **must not** use the index operator `[]` in this task) *(5 marks)*:

```
f2_ptr = fs + 1;
```

g) Write an expression that assigns to a pointer `f2_ptr` an address of the third (index: 2) element of the array `fs` (you **must** use the index operator `[]` in this task) *(5 marks)*:

```
f2_ptr = &fs[2] ;
```

h) Answer whether it is a legal operation to assign a new value to an object via a pointer `f_ptr`; justify your answer *(10 marks)*:

(-1) It is not a legal operation as pointer f_ptr is [not initialised to an address of a pointee. (-1) [it should be NULL]]

i) Answer what is now the result of the expression (`f2_ptr + 1`) and whether it points to a valid object in memory: *(10 marks)*

```
f2_ptr + 1 = &fs[3] ;   (-1)
```
R-value; cannot be assigned to.

(-1) expression (f2_ptr + 1) points to a valid object in memory. It points to the address of the 4th element of the array fs.

2. Write a program

Write a complete program that asks the user for input of two integer numbers, swaps them using a function swap of your implementation, and displays the two numbers in their swapped order. *(40 marks)*

```
#include <stdio.h>
void swap (int*, int*);
int main(void)
{ int num1, num2;
  printf("input first number \n");
  scanf("%d", &num1);
  printf("input second number \n");
  scanf("%d", &num2);
  swap(num1, num2);
  printf("first number is : %d\n", num1);
  printf("2nd number is : %d\n", num2);

  return 0;
}
```

(-16)

swap(num1, num2); → (-1) swap (int num1, int num2); (-5 -5)

Lacks of forward declaration; undefined here.

```
#include <stdio.h>

int swap (int first, int second)
{
  int temp;
  temp = first;
  first = second;
  second = temp;
}

void swap (int* first, int* second)
{
  int temp;
  temp = *first;
  *first = *second;
  *second = temp;
}
```

(-5) Swaps values of local parameters; not original variables.

End of quiz.