Lab2
Understand the "PhotoLab" program Name_____

Please read assignment2 and answer one of the following questions. You only need to answer one question for the color of your group.

1. Menu-Design **[White Group]**
   a. What is the input and output of the "PhotoLab" Program?
   Input: user choices, original image, user input parameters for the AddBorder() function.
   Output: program messages, processed images.
   b. How would you design the menu for this program?
   Wrap the printf() functions for menu displaying in PrintMenu() function;
   Define a variable for user choice in Main().

   For one iteration of the menu actions,
   call PrintMenu() in Main() to show the menu;
   then, call scanf() to get the user's choice and store the value in the choice variable.

   c. Which types of control flow would you use for the program menu?
   While loops to keep showing the menu until user chooses exit.
   Switch-case to handle different choices.

2. Represent images in C **[Red Group]**
   a. A photo is a two-dimensional object. Which type of data structure would you use to represent a photo in C?
   Three 2-dimensional arrays:
   unsigned char R[WIDTH][HEIGHT];
   unsigned char G[WIDTH][HEIGHT];
   unsigned char B[WIDTH][HEIGHT];

   b. How to use this data structure to represent a photo with colors?
   A photo ➔ a set of pixels
   A pixel has only one color which can be represented by a 3-tuple of unsigned char numbers (r, g, b) where r is the intensity of the red channel, g for the green channel, b for the blue channel.

   c. Assume that the width of the photo is 720, the height of the photo is 538, how to define the variables in C to represent the color photo?
   /*at the beginning of the source code file*/
   #define WIDTH 720
   #define HEIGHT 538

   ….
   /*define the arrays*/
   unsigned char R[WIDTH][HEIGHT];

unsigned char G[WIDTH][HEIGHT];
unsigned char B[WIDTH][HEIGHT];

d. We need to scan the photo in order to perform certain manipulations on it, e.g. change it to black&white, flip the photo, which type of control flow would you use to scan the photo? How?
(Please refer to Section 1.1, 1.4.2, 1.4.3)
Two nested for loops:

```
int x, y;
for(x = 0; x < WIDTH; x ++)
{
        for(y = 0; y < HEIGHT; y ++)
        {
                Operation on pixel(x, y);
        }
}
```

3. Program Design **[Yellow Group]**
   a. How may functions would you like to use for this program? Please name them and describe their functionalities.
   Please refer to assignment2 Section 1.4.1.

   b. There are two different ways to pass arguments to functions in C. Please name these two and use one of your functions to describe the difference between them.
   Pass by value
   Pass by reference

   c. What is the scope of an identifier? What are the rules for the scopes?
   Please refer to the slides for lecture 6.

   d. Would you like to use identifiers with different scopes in this program? Please describe something about your design for the variables' scopes that you would use for this program.
   (Please refer to section 1.4)

   No global variables are needed.
   Only use local variables to functions.