

# CS 150 Lab 12

## Functions

The purpose of today's lab is for you to get some hands-on experience with functions, arrays, and files!

- **Be sure to answer the given questions before you start**
- Be sure your output looks exactly like the specified output
- Be sure to submit your solution to CS150-02 Drop when you are done (By Friday, Nov 19, 5pm)
- Show the instructor or TA your solution before submitting it

### Lab 12.1 Files & Arrays as function parameters.

For this lab, you will need to create a new Visual Studio project that will contain your source code. Name this project "12Lab\_1\_XXXXXXXX", replacing the XXXXXXXX with your PUNetID.

► Write the algorithm to main() first, as we did in class on Monday, and use that algorithm to identify **meaningful functions**.

The file weather.txt contains weather data for various dates. The first line of the file contains a month and year, the second line of the file contains the weekly high temperatures (always exactly 4) for each week in that month and the next line contains the weekly low temperatures for that month (always exactly 4). This pattern is repeated for several months.

```
January 2010
15 32 48 29
9 23 30 12
February 2010
30 44 50 33
11 13 40 22
```

Sample Input File *weather.txt*

```
January 2010
Weekly Highs: 15 32 48 29
Weekly Lows : 9 23 30 12
Average High: 31.0
Average Low : 18.5

February 2010
Weekly Highs: 30 44 50 33
Weekly Lows : 11 13 40 22
Average High: 39.3
Average Low : 21.5
```

Sample Output File *analysis.txt*

Sample input and output is shown above. You must write at least **two meaningful functions**, not including main(), to solve this problem.

1. Write the function prototypes for each function you will need to write.

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## Challenge Passing 2+ Dimensional Arrays to a function (Page 416)

You do not need to submit this challenge.

The PPM image (<http://netpbm.sourceforge.net/doc/ppm.html>) allows images to be stored as text files. A sample image file is shown at right. The first line says that the file format is version 3, the second line says the image is 3 pixels by 2 pixels; the third line says the maximum value in the file is 255. The remaining lines are the pixels. Each pixel is made of three numbers: red, green, and blue. The file shows white (red 0, green 0, blue 0), black (red 255, green 255, blue 255), and red (red 255, green 0, blue 0) pixels on top of black, white, and green pixels. Whitespace does not matter in this file.

```
P3
3 2
255
0 0 0      255 255 255  255 0 0
255 255 255 0 0 0    0 255 0
```

Two example files, test.ppm and ghost.ppm, are located in the Public folder on Turing. More images are here:

<http://cms.brookes.ac.uk/staff/SharonCurtis/teaching/archives/fp/imageplay/imagesamples.html>

**NOTE:** PPM files may contain comments (starting with a #). To make this project simpler, the comments have been removed from the files on Turing. If you download any files from the Internet you may need to remove comment lines. You can open the .ppm files in Visual Studio to edit them.

You need to write a program that will read a PPM file as shown above (with a maximum size of **256 x 256** pixels. To save memory, use the data type **short** instead of **int** to store the integer values in the image.) You need to produce a “red shifted” image and write it to a file. To produce a red shifted image, for each pixel you need to double the red value. If the red value is already the maximum value, cut the blue and green values in half and leave red unchanged. If the red value is zero, set the red value to twice+1 the maximum of the blue and green values. Write the red shifted image to a file. Produce a blue shifted image in the same way and write it to a file.

Build a function to blur or fuzz an image.

[http://www.cgafaq.info/wiki/Image\\_Sharpening\\_and\\_Blurring](http://www.cgafaq.info/wiki/Image_Sharpening_and_Blurring)

To display these files, you can use the `i_view32.exe` application in the Public folder on Turing. Copy this file to your Desktop and double click on the icon. This will start the IrfanViewer.

<http://www.irfanview.com/> for more information.

1. Write the function prototypes for each function you will need to write.

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