

# CP367: Assignment 1 – Winter 2024

**Due on Jan 29, 2024 (Before 11:59 PM)**

This is an **individual** assignment, and we will try to practice C programming concepts.

## General Instructions:

- For this assignment, you must use C99 language syntax. Your code must compile using make **without errors**.
- **Test your program thoroughly with the GCC compiler in a Linux environment.**
- If your code does not compile, **then you will score zero**. Therefore, ensure you have removed all syntax errors from your code.
- **Gradescope** platform would be used to upload the assignments for grading. The link to the Gradescope assignment is available on Myls course page. Drag and drop your code file(s) for submission into Gradescope. **Make sure your file name is as suggested in the assignment; using a different name may score zero.**
- Please note that the submitted code will be checked for plagiarism. Submitting these .c files would confirm that you have not received unauthorized assistance in preparing the assignment. You also confirm that you are aware of course policies for submitted work.
- Marks will be deducted from any questions where these requirements are not met.
- Multiple attempts will be allowed, but your last submission will be graded before the deadline. Instructors reserve the right to take off points for not following directions.

## Warning:

Follow the assignment instructions to the letter in terms of the file names and function names, as this assignment will be auto graded. If anything is not as described, the auto-grading fails, and your assignment will be given a **Zero** mark.

## Question 1

Blaise Pascal (1623-1662) was a French mathematician and religious philosopher. In science, he is known for, among other things, a mechanical calculator, the Pascal calculator, and the Pascal triangle, which is the subject of our interest.

The Pascal triangle is a lower triangular array defined by the relation:

$$\begin{aligned}x_{i,1} &= x_{i,i} = 1 \text{ for } 1 \leq i \\x_{i,j} &= x_{i-1,j} + x_{i-1,j-1} \text{ for } 3 \leq i \text{ and } 2 \leq j \leq i-1\end{aligned}$$

The Pascal triangle is used to compute the coefficients of the binomial expansions (such as  $(x+y)^2$ ).

Write a C program (name it *triangle.c*) to ask the user for a positive integer  $n$ , then compute and display the first  $n$  rows of the Pascal triangle. Your program should not crash on bad input (for example, when the user enters a character instead of a positive integer). The columns should be aligned and left justified (flush-left); for this purpose, you may assume  $n < 15$ , so you need only 5 spaces for the integers, and you can fit a row in one line.

Use the following command to compile the code:

```
$ gcc triangle.c -std=c99 triangle.c -o triangle
```

The above code will create the *./triangle* executable file

The expected output for executing:

When running on Linux Terminal the command `./triangle`. It will print:

Please enter a value for the Pascal triangle

1. If a negative number or a number greater than 15 is entered, then the code should print on the console:

Invalid input. Please enter a positive integer less than 15.

2. If 5 is entered, the output will be:

1

1 1

1 2 1

1 3 3 1

1 4 6 4 1

**Important Note:** When submitting a source code file to Gradescope, make sure to name it like:

- `triangle.c`

## Question 2

Write a C program that takes in a string that holds the values "day" or "night" and an integer that holds a person's age, and outputs a movie ticket price. Movie prices are free for everyone under the age of 4. Daytime prices are \$8 for everyone age 4 or higher. Nighttime prices are \$12 for ages 4 - 16, \$15 for ages 17 - 54 and \$13 for ages 55 and above.

Use the following command to compile the code:

```
$ gcc triangle.c -std=c99 ticket.c -o ticket
```

The above code will create the `./ticket` executable file

The expected output for executing:

When running on Linux Terminal the command `./ticket`. It will print and ask for time and age:

Enter the time:

Enter the age:

1. if time= "night" and 50 is entered, then the output is:

\$15

2. if time= "day" and 15 is entered, then the output is:



\$8

3. Ex: if time= “night” and 3 is entered, then the output is:

free

**Important Note:** When submitting a source code file to Gradescope, make sure to name it like:

- `ticket.c`

### Question 3

Create a C program (name it "filecopy.c") that copies the contents of one file to a destination file. This program will read data from one file and copy them to another. The first input that the program will need is the names of the two files: input file (“input.txt”) and output file (“output.txt”). Once the two file names have been obtained, the program must open the input file and create and open the output file. If the input file exists, we must create a new output file with the above output file name.

When both files are set up, the program may use a loop that reads from the input file and writes to the output file. On input, the program may find that the end of the input file has been reached and finished copying.

Here, the input and output file names are provided as command-line arguments (Do not hardcode the file names in the program). Once the program is written, use the following command to copy the input file (“input.txt”) to the output file (“output.txt”).

Use the following command to compile the code:

```
$ gcc filecopy.c -std=c99 filecopy.c -o filecopy
```

The above code will create the ./filecopy executable file. Now, on terminal to run this programme type in the command as:

```
./filecopy input.txt output.txt
```

The expected output for executing:

1. **./filecopy**: If no argument (input and output files names) is not supplied ./filecopy, then it should print on console:

```
Insufficient parameters passed.
```

2. **./filecopy input.txt output.txt**: this should print on console:

```
The contents of file input.txt have been successfully copied into the output.txt file.
```

**Important Note:** When submitting a source code file to Gradescope, make sure to name it like:

- `filecopy.c`