Name: _____

Problem	Points	Score
1	50	
2	50	
Total	100	

Notes:

(1) The first step in this exam is to create a workspace in the following directory:

   /data/courses/ece_1111/current/exams/ex_02

Your directory should be your last name all lowercase, followed by an underscore, following by your first name (e.g, "picone_joseph"). Set the permissions using "chmod u+rwx,g-rwx,o-rwx <lastname>" so only you have read and write permission to this directory. Create subdirectories within this directory: p01, p02, … You will use these for problems 1 and 2, … respectively. Put ALL your code in these directories. Do not touch your files after the exam is over.

(2) For this exam you are allowed to open a terminal window on your computer, you are allowed to web surf with Google, but you cannot use online chat, ChatGPT or other interactive services. Your code must be your own original work.

(3) All your solutions should use a make file, a header file, a driver program (e.g., p01.cc), and an implementation file (e.g., p01_00.cc). Your executable should be named *.exe (e.g., p01.exe).

(50 pts) Problem No. 1:

This file:

```
/data/courses/ece_1111/current/exams/ex_02/picone_joseph/example.dat
```

contains short integers. Write a program that reads the file buffer by buffer and prints the values that were read to stdout. Your program should take a frame size and a window size as command line arguments:

```
p01.exe 2 4 example.dat
```

In this case, "2" is the frame size (the number of samples you shift) and "4" is the window size (the number of samples available for processing).

Your window should be "left-aligned". For the example above, your program should print out the following:

```
0: 0 1 2 3
1: 2 3 4 5
2: 4 5 6 7
...
```

If you run the program this way:

```
p01.exe 1 5 example.dat
```

your output would be:

```
0: 0 1 2 3 4
1: 1 2 3 4 5
2: 2 3 4 5 6
...
```

Your code needs to be in a directory /p01 with names Makefile/p01.h/p01.cc/p01.exe. Your program should work for any combination of frame and window size.

You must read the file using the frame size. In the first example above, you would read two samples at a time. Therefore, you must buffer the data. You cannot seek back and forth in the file. Your code should contain a while loop reading "frame size" samples with each iteration. You must use fopen/fread/fclose to implement this.

You should be able to reuse code you have already written for the labs and homework assignments.

(50 pts) Problem No. 2:

This file:

    /data/courses/ece_1111/current/exams/ex_02/picone_joseph/matrix.dat

contains two matrices. Write a program that reads the file, adds the matrices together (loop over the matrix and add each element), and prints the sum of the two matrices in a nicely formatted display to stdout:

    p02.exe matrix.dat

    matrix 1:
    1.0 0.0 0.0
    0.0 1.0 0.0
    0.0 0.0 1.0
    matrix 2:
    0.0 1.0 1.0
    1.0 0.0 1.0
    1.0 1.0 0.0
    sum:
    1.0 1.0 1.0
    1.0 1.0 1.0
    1.0 1.0 1.0

Your program should work for any square or rectangular matrix as long as the dimensions of the two matrices are the same. You should be able to reuse code you already have in place from previous assignments.