24-780 Engineering Computation Problem Set 08

You need to create a ZIP file (It may appear as a compressed folder in Windows) and submit the ZIP file via the 24-780 Blackboard course. The file name of the ZIP file must be:

PS08-YourAndrewID.zip

For example, if your Andrew account is *hummingbird@andrew.cmu.edu*, the file name must be:

PS08-hummingbird.zip

If your ZIP file does not comply with this naming rule, you will automatically lose 5% credit from this assignment. If we are not able to identify who submitted the file, you will lose another 5% credit. If we finally are not able to connect you and the submitted ZIP file, you will receive 0 point for this assignment. Therefore, please make sure you strictly adhere to this naming rule before submitting a file.

The ZIP file needs to be submitted to the 24-780 Blackboard course. If you find a mistake in the previous submission, you can re-submit the ZIP file with no penalty as long as it is before the submission deadline.

Notice that the grade will be given to the final submission only. If you submit multiple files, the earlier version will be discarded. Therefore, if you re-submit a ZIP file, the ZIP file MUST include all the required files. Also, if your final version is submitted after the submission deadline, late-submission policy will be applied no matter how early your earlier version was submitted.

Make sure you upload your Zip file to the correct location. If you did not upload your assignment to the correct location, you will lose 5%.

The ZIP file needs to include:

ps8.cpp

Submission Due: 10/27 (Tue) 23:59

PS8 Line drawing [ps8.cpp] (100 points)

Download shape1.txt, shape2.txt, shape3.txt, and shape4.txt from the Blackboard. Content of each file is as follows:

```
1st line: Number of lines
2nd line: x1 y1 x2 y2 r g b   (line coordinates and color)
3nd line: x1 y1 x2 y2 r g b   (line coordinates and color)
                :
                :
```

Y-coordinate in the data file is taken such that the bottom of the window is zero. Therefore, you need to flip the Y-coordinate upside down to get a correct picture.

Your assignment is make a **class** that reads the file content, and draw lines on the screen. The picture will fit in the 800x600 window.

Write a C++ program that takes a file name (one of the input text files) as input from the user, and show the picture described in the specified text file. For full credit,

1. The program prompts the user "Enter File Name>" and takes file name from the console window using fgets. Make sure to remove the control code at the end of the string. Your program needs to take a file name up to 255-characters long. (If you want to use cin, that's ok, too.)
2. Make a class called Line2D.
    a. The class must have two screen coordinates and color as protected member variables.
    b. The constructor of the class makes all member variables zero.
    c. The class must have a member function called Draw, which draws itself, and the function must be actually used in the program.
    d. The class must have a member function called MakeFromString, which takes a C-string as input from which x1, y1, x2, y2, r, g, and b are extracted. The extracted values are stored in the member variables. The function must be actually used in the program. You can use a parsing function of string-parser class covered in the lecture for extracting words, or if you are more comfortable with the function *strtok*, that's ok, too.
3. Make a class called Drawing2D.
    a. The class must store a pointer to Line2D class and the number of lines, as protected member variables. (For practice purpose, don't use std::vector even if you know how to use it.)
    b. Assume that the class may be re-used by someone else. Make sure there is no chance of memory leak. For this assignment, you don't have to be worried about copy operator and copy constructor.
    c. The class must have a member function called Draw, that draws all lines stored in this class.
    d. The class must have a member function called ReadFile, that takes a file name as input, and read the input file. The function must be actually used in the program.
4. Use const qualifiers in all appropriate places.
5. If you study ahead, you may be aware of constexpr qualifier, which is new in C++11. But, don't use constexpr this time. Older compilers don't support this specification, yet.
6. The program must terminate when the user presses the ESC key on the graphics window.

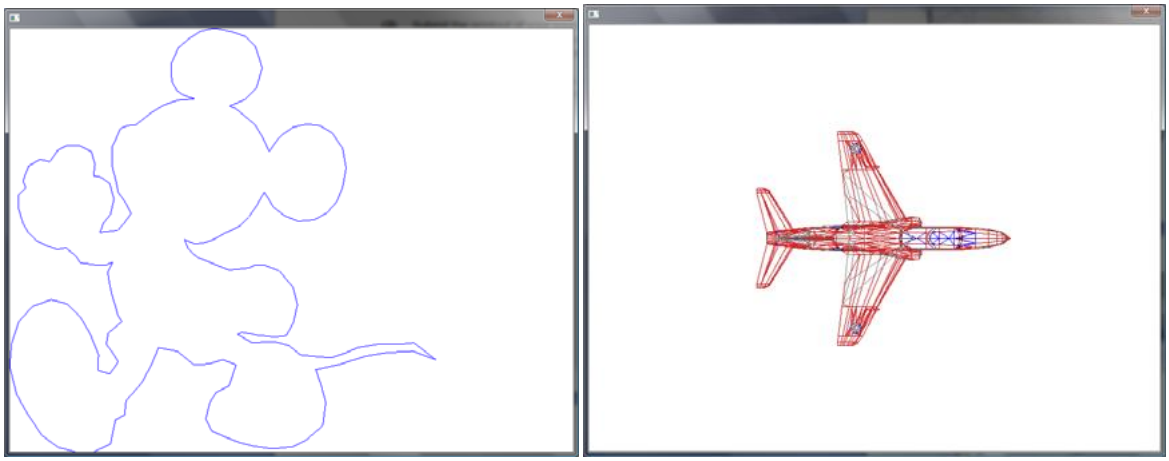
You can include additional functions, classes, and member functions if necessary or if it makes it easier for you.

The file name of the C++ program must be ps8.cpp and must be included in the Zip file.

3 extra points if you are able to move the picture by mouse. It should be done by (1) pressing the mouse left button anywhere on the graphics window, (2) moving the mouse cursor while the left button is held down. The moving should stop when the user releases the left button. The displacement must be exactly same as the displacement of the mouse cursor.

2 more extra points if you are able to reset the picture position by pressing the SPACE key.

2 more extra points if you make Drawing2D function safe for the copy operator and copy constructor (By implementing it. Not by making them private or protected.)



Running images