CI4810/6810
Fall 2022

Assignment 2: Program 3 (30 points)
Due Date: September 30, 2022 – Friday – 11:59pm

The whole purpose of this assignment is for you to implement a program that given a graphics image made up of 2D lines, your program can demonstrate that it can Translate, Scale, Rotate, … the image (using the matrix representations of the transformations). You should build a simple user-interface that receives commands from the user, … The following functions are my suggestions – but I am sure that you are more creative than I am; therefore, use your own program design if you wish. Assume that the main purpose of writing this program is for you to build a simple 2D graphics program that you can use to demonstrate to an individual (CEO of a company, manager of a corporation, …) that your program can perform 2D geometric operations. Thus, what appears below (in terms of functions, …) are only suggestions.

Implement each of the following functions:

- **Inputlines** (datalines, num)
  { Reads 'datalines' from an external file (name of file is provided by the user). On return `num' will contain the number of lines read from the file. }
- **ApplyTransformation** *(matrix, datalines)*
  {applies the transformation matrix to the lines that appear in "datalines"}
- **Displaypixels** (datalines, num)
  { Displays (i.e., scan-converts) 'datalines' containing `num' lines }
- **Outputlines** (datalines, num)
  { Outputs 'datalines' containing `num' lines to an external file (name of file is provided by the user). }
- **BasicTranslate** (Tx , Ty)
  { Translation - `Tx' is the horizontal and `Ty' is the vertical displacements. }
- **BasicScale** (Sx, Sy)
  { Scale - `Sx' and `Sy' are the horizontal and vertical scaling factors; center of scale is at the origin of the Coordinate System. }
- **BasicRotate** (angle)
  { Rotation - angle of rotation is `angle' degrees (clockwise); Center of rotation is at the origin of the Coordinate System. }
- **Scale** *(Sx, Sy, Cx, Cy)*
  { Scale - `Sx' and `Sy' are the horizontal and vertical scaling factors; center of scale is at Cx, Cy. }
- **Rotate** *(angle, Cx, Cy)*
  { Rotation - angle of rotation is `angle' degrees (clockwise); Center of rotation is at Cx, Cy. }

Embed the suggested functions above (together with other functions that may be needed) into a complete program to build a simple graphics system.

Notes:

- Build a suitable user-interface so that the functionality of your program can easily be demonstrated.
- Your program must be well structured/engineered.
- The ONLY built-in drawing function you are permitted to use is the function that when called would activate a pixel on the display monitor.
- Use the matrix representation of the transformations.
- Concatenation must be done during execution time.

SUBMISSION:

Please create a directory and include the following in that directory:

1. Your source programs for Assignment 2
2. A demonstration video illustrating that the program is working correctly. In that video you should include multiple sessions, … Your task is to convince the viewer that your program can Translate, Basic Scale, Basic Rotate, General Scale and General Rotate, …

Upload the directory to ELC (go to “Tools” – go to “Assignments” – go to “Assignment 2” and then upload.