

UNIVERSITY OF DELAWARE
DEPARTMENT OF COMPUTER AND INFORMATION SCIENCES
CISC 4/640: COMPUTER GRAPHICS, Fall 2005
Programming Assignment-3 Due 10/25/05 (Tue.) by 10PM.

Modify your present graphics system to include 2D geometric transformations. You will be provided with a skeleton program that defines the menu structure (available from TA's course web-page). You need to: i) call your own matrix multiplication functions to do the transformations, not the OpenGL commands, ii) call your own scan-fill algorithm that you developed in the previous project, iii) implement the window-to-viewport transformation to make sure the world-coordinates of all objects are displayed properly in the viewport.

- User should be able to create polygons from either files, or mouse. The format of files are same as the previous project.
- User should be able to apply any specified sequence of transformations to a displayed polygon. The program is to be designed such that a user selects the polygon and the transformation sequence from pop-up menus. The associated parameters for each transformation can be typed from the keyboard. The composite transformation should be calculated and used to transform the polygon. Fill the original polygon and transformed polygon in different colors.
- User can use mouse in order to interactively translate, rotate and scale the object after selecting a given polygon (selection can be done as explained below). Middle button is used for these transformations. Left to right sweep of the middle button for x-scaling (and bottom to top for y-scaling) can be used for upscaling, and opposite for downscaling. Similarly, left to right sweep will be for positive rotation, and opposite for negative rotation.
- User can edit the polygons existing on the screen. He/She can add the polygons directly to the existing polygons on the screen, or delete selected polygons present on the screen. Selection of a polygon can be done by just calculating the distances from the mouse location and all vertices of the polygons present. Least distance can then be used to select the polygon. This is a very simple approach; more robust approaches include finding the center of the polygon first and calculating the distance between mouse and this center. Feel free to implement your favorite method here. Make sure to draw rectangular dots at each vertex of the polygon to indicate the selection.
- The transformation sub-menu includes 4 items: i) Translate, ii) Rotate, iii) Scale and iv) Apply. Each time the user chooses i), ii) or iii), the respective parameters can be typed-in. Apply is used when the user is done with specifying the sequence of transformations.
- (required for CISC640; Extra Credit for CISC440: 1 Point) Add a sub-menu item v) animate. Each time user chooses this option (after selecting a polygon), the system waits for "path-of-travel" for that polygon. User clicks at different locations on the screen, and after choosing "apply", the selected polygon should be animated through the path till the final destination. The polygon is drawn as a boundary at each step of animation, but at the destination, filled-up.