# Computer Graphics - Final Project Report

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**Functionalities:**

All the required shapes and operations have been implemented. Additionally, for the extra credit section, I have added the following functions:

- Export as PDF
- Zoom In and Zoom Out

Please find the detailed explanation in the video: https://youtu.be/sqf0GjFTo_Y

**Lessons Learned:**

Implementing each shape and its manipulation, such as scaling, rotation, and translation, proved to be the most time-consuming aspects of the project. This project provided me with valuable insights into shape handling, utilizing mouse events (mousedown, mousemove, mouseup) for efficient shape drawing, and incorporating keyboard events for various operations. I also gained a deeper understanding of using the canvas context (ctx) effectively for rendering shapes. Additionally, implementing a robust history storage mechanism for undo and redo functionality required numerous trials and errors, leading to valuable learning experiences. This project also emphasized the importance of user-friendliness and ease of use.

**Issues Faced:**

Implementing selection was more challenging compared to other operations. It was difficult to check if the cursor point was within a shape and to properly determine its boundaries. The logic for rotation and scaling was also challenging. Finding the change in angle and moving the points accordingly was difficult to implement. Initially, rotation was not working for ellipses, but after further analysis, I was able to successfully fix the bug. Handling user interactions, particularly the mousemove operation, required extensive analysis. However, once one shape was properly implemented, it became easier. Initially, the undo operation had limitations, but later I was able to extend it to support unlimited undo/redo operations.

All the operations are implemented with no remaining bugs.