PROBLEM SOLVING

Introduction:

This program serves as a tool to perform multiple operations on different conics (such as circle, ellipse, hyperbola, line and parabola), matrices (add, multiplication, subtraction and single matrix operations) and on triangles in the least possible time.

Background:

As many students face difficulties in order to solve mathematical problems or double check their answers so this program was made to overcome this difficulty. Solving matrices is more convenient through this program than using a common scientific calculator to perform matrix calculation.

Project specification:

Through this program one can solve any problem of conic (such as finding foci, center, eccentricity and vertices of these equations $ax^2 + ay^2 + bx + cy + d = 0$ **OR** $ax^2 - by^2 + Cx + Dy + F = 0$ **OR** $y^2 + ay + bx + F = 0$) and can find a complete solution of any triangle (such as finding angles when sides are given or finding in centre, in radius and area) and solution of matrices.

This program mainly consists of three sections and many sub sections:

Section 01: Conic

Section 02: Matrix

Section 03: Filing

Problem analysis:

In order to write this program it was divided into 3 sections as discussed above and further these were divided into many sub-sections mathematical solutions and algorithms were made to implement the logic in c language. One example is attached below.

equation of parabola.

$y^2 + By + Cx + F = 0$

$y^2 + By = -Cx - F$

$y^2 + By + \left(\frac{B}{2}\right)^2 = -Cx - F + \left(\frac{B}{2}\right)^2$

$\left(y + \frac{B}{2}\right)^2 = -C\left(x + \frac{F}{C} - \frac{B^2}{4C}\right)$

$\left(y - \left(-\frac{B}{2}\right)\right)^2 = 4\left(-\frac{C}{4}\right)\left(x - \left(\frac{B^2}{4C} - \frac{F}{C}\right)\right)$

$k = -B/2, \quad a = -C/4 \quad h = \frac{B^2}{4C} - \frac{F}{C}$

print ("Enter $y^2 + By + Cx + F = 0$ B, C, F")

Float k, a, h

$k = -B/2$

$a = -C/4$

$h = \frac{B^2}{4*C} - \frac{F}{C}$

Print (" Centre (h, k) ")

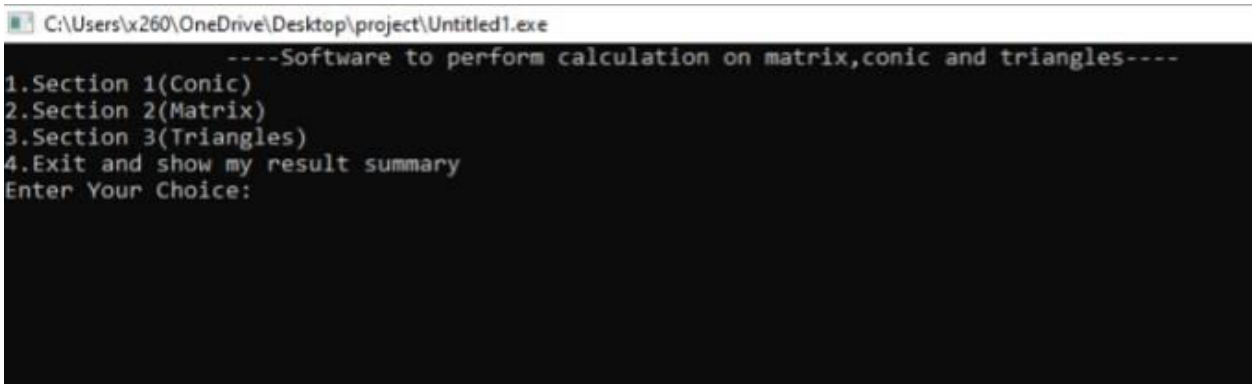
Print (" focus (h+a, k) ")

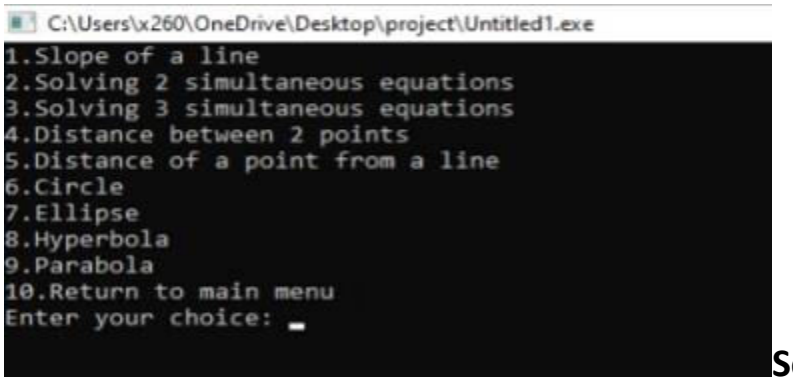
Print ("Latus rectum 4(a) ")

Solution Design:

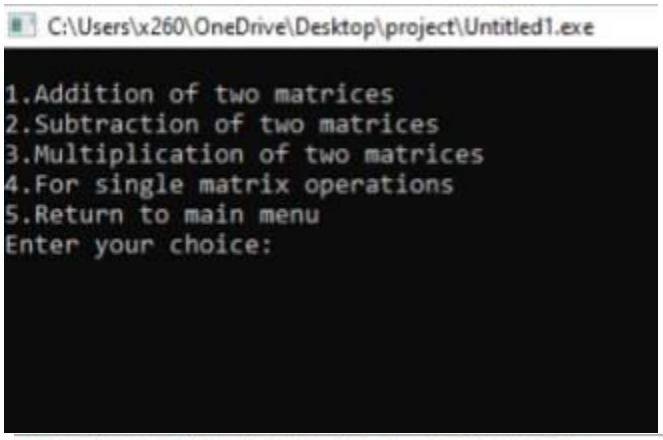
In order to compile our program, we have used concept of function, pointers and filing. Multiple functions were used such as take nothing and return nothing nature or take something and return nothing nature call by value and call by reference was also done in this program. Writing and reading from a file was also done to store result. Use of loops and recursion was also done to perform a single task multiple times or in order to switch from sub section to main menu. Extensive use of if-else and switch-case was done to provide choices to switch from 1 menu to other. The use of 2d arrays was also done extensively in order to perform matrix calculations.

Implementation:

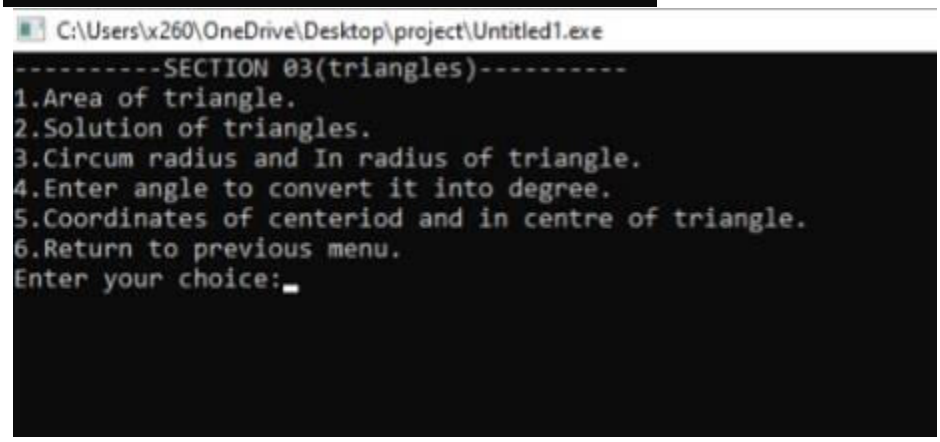




Section 01

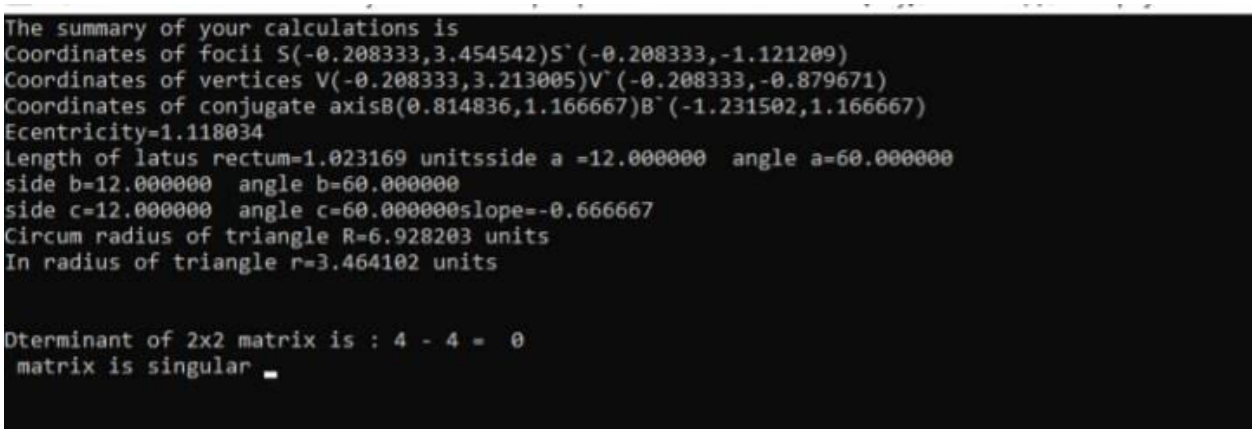


Section 02



Section 03

There is a main menu in this program with 3 sections mainly one can perform any number of desired task multiple times. In the end the dialog box will show the summary of the calculations you performed for example:



The result summary is saved in file and in the last it is printed through filing.

Project Breakdown:

Section 2 of matrix was made by 20k-0343

Section 1 and 3 was made by 20k-0344

Filing, advancement and debugging was done by 20k-0311

Result and conclusion:

After all implementation of functions, pointers and filing, we were able to complete our program and it works perfectly. It was made to solve complex mathematical problems in a fraction of time.