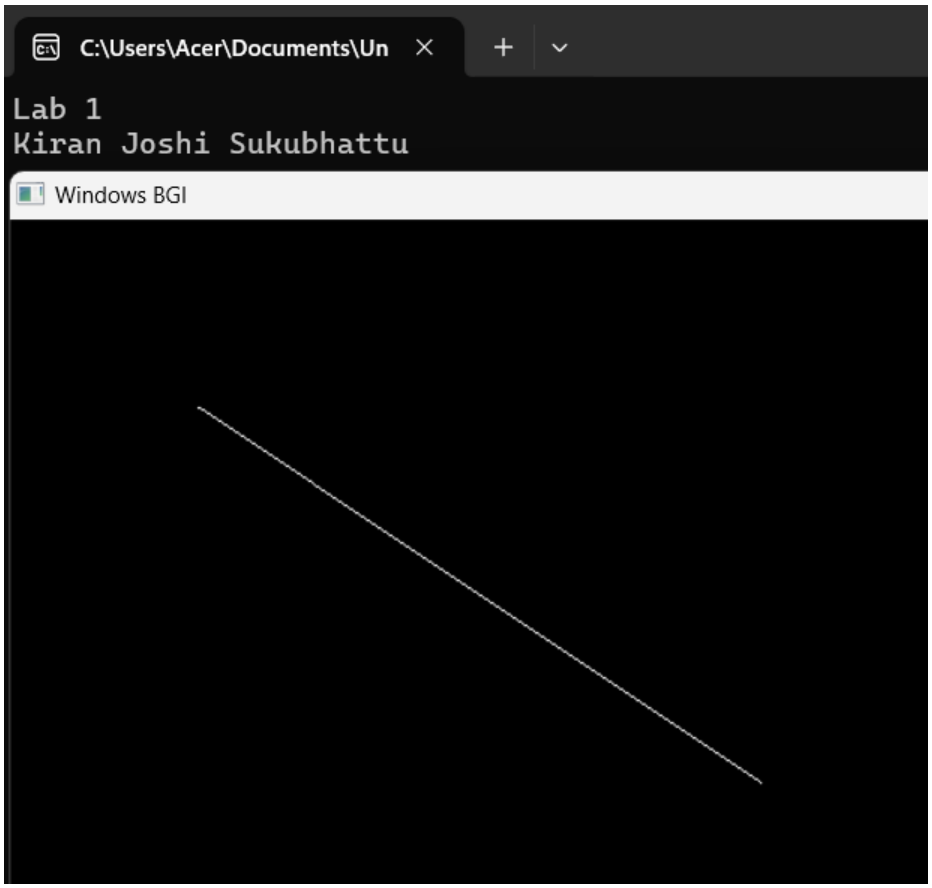
LAB 1: **DDA line drawing algorithm to generate a line.**

```
#include <iostream>
#include <graphics.h>

void drawLineDDA(int x1, int y1, int x2, int y2) {
   int dx = x2 - x1;
   int dy = y2 - y1;
   int steps;

   if (abs(dx) > abs(dy))
      steps = abs(dx);
   else
      steps = abs(dy);

   float xIncrement = dx / (float)steps;
   float yIncrement = dy / (float)steps;

   float x = x1;
   float y = y1;

   for (int i = 0; i <= steps; i++) {
      putpixel((int)x, (int)y, WHITE); // Draw the pixel

      x += xIncrement; // Increment x
      y += yIncrement; // Increment y
   }
}

int main() {
            printf("Lab 1\n");
            printf("Kiran Joshi Sukubhattu");
```

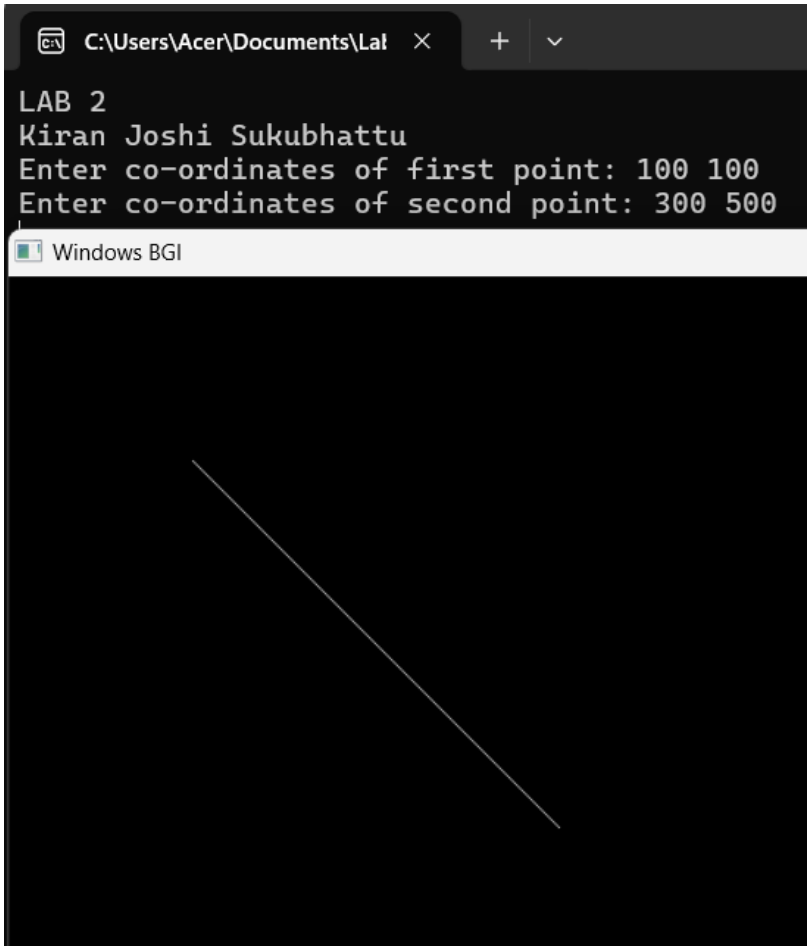
```
    int gd = DETECT, gm;
    initgraph(&gd, &gm, ""); // Initialize graphics mode

    // Coordinates of the endpoints of the line
    int x1 = 100, y1 = 100, x2 = 400, y2 = 300;

    drawLineDDA(x1, y1, x2, y2);

    getch(); // Wait for a key press
    closegraph(); // Close graphics mode
    return 0;
}
```



LAB 2: **Bresenham's line drawing algorithm to generate a line.**

```
#include <iostream>
#include <graphics.h>
using namespace std;

void drawline(int x0, int y0, int x1, int y1)
{
   int dx, dy, p, x, y;
   int gdriver = DETECT, gmode, error;
   initgraph(&gdriver, &gmode, "");

   dx = x1 - x0;
   dy = y1 - y0;

   x = x0;
   y = y0;

   p = 2 * dy - dx;

   while (x < x1)
   {
      if (p >= 0)
      {
         putpixel(x, y, 7);
         y = y + 1;
         p = p + 2 * dy - 2 * dx;
      }
      else
      {
         putpixel(x, y, 7);
         p = p + 2 * dy;
```

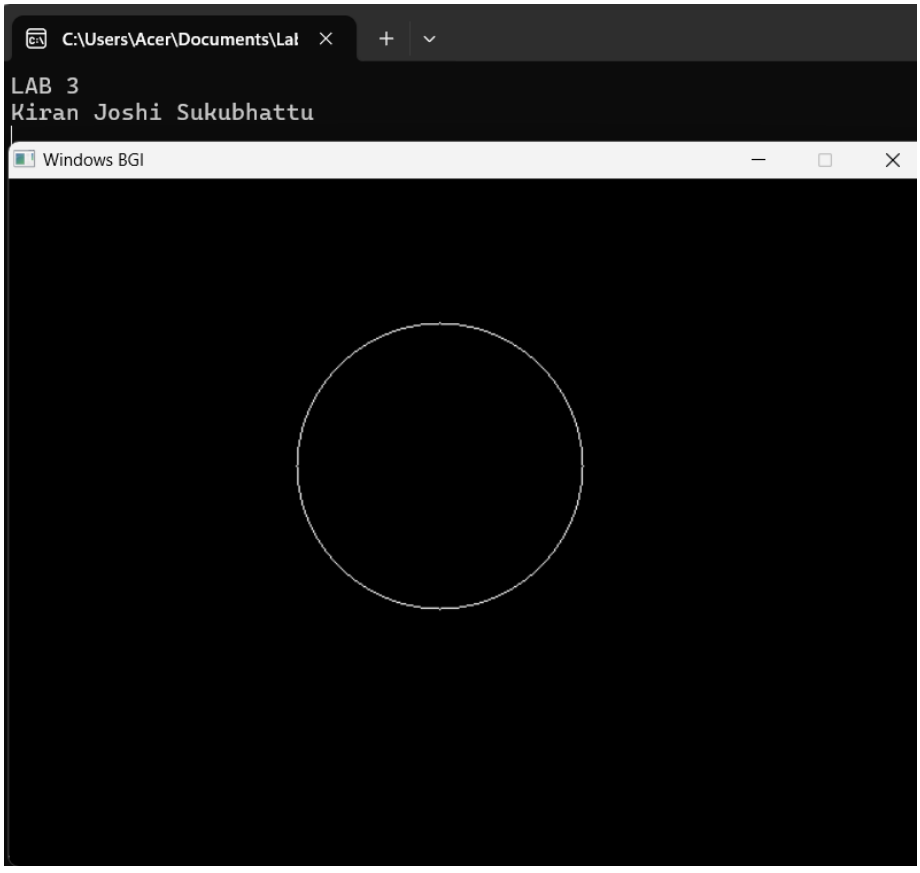
```
        }
        x = x + 1;
    }
}

int main()
{
 printf("LAB 2\n");
 printf("Kiran Joshi Sukubhattu\n");
            int x0, y0, x1, y1;

    cout << "Enter co-ordinates of first point: ";
    cin >> x0 >> y0;

    cout << "Enter co-ordinates of second point: ";
    cin >> x1 >> y1;
    drawline(x0, y0, x1, y1);
    getch();

    return 0;
}
```


C:\Users\Acer\Documents\Lal
LAB 2
Kiran Joshi Sukubhattu
Enter co-ordinates of first point: 100 100
Enter co-ordinates of second point: 300 500
Windows BGI

LAB 3: **Midpoint circle drawing algorithm for circle drawing.**

```
#include <graphics.h>

void drawCircleMidpoint(int xc, int yc, int radius) {
   int x = radius;
   int y = 0;
   int err = 0;

   while (x >= y) {
      putpixel(xc + x, yc + y, WHITE);
      putpixel(xc + y, yc + x, WHITE);
      putpixel(xc - y, yc + x, WHITE);
      putpixel(xc - x, yc + y, WHITE);
      putpixel(xc - x, yc - y, WHITE);
      putpixel(xc - y, yc - x, WHITE);
      putpixel(xc + y, yc - x, WHITE);
      putpixel(xc + x, yc - y, WHITE);

      if (err <= 0) {
         y += 1;
         err += 2 * y + 1;
      }

      if (err > 0) {
         x -= 1;
         err -= 2 * x + 1;
      }
   }
}
```

```
int main() {
    printf("LAB 3\n");
    printf("Kiran Joshi Sukubhattu\n");
    int gd = DETECT, gm;
    initgraph(&gd, &gm, ""); // Initialize graphics mode

    // Coordinates of the center of the circle and its radius
    int xc = 300, yc = 200, radius = 100;

    drawCircleMidpoint(xc, yc, radius);

    getch(); // Wait for a key press
    closegraph(); // Close graphics mode
    return 0;
}
```

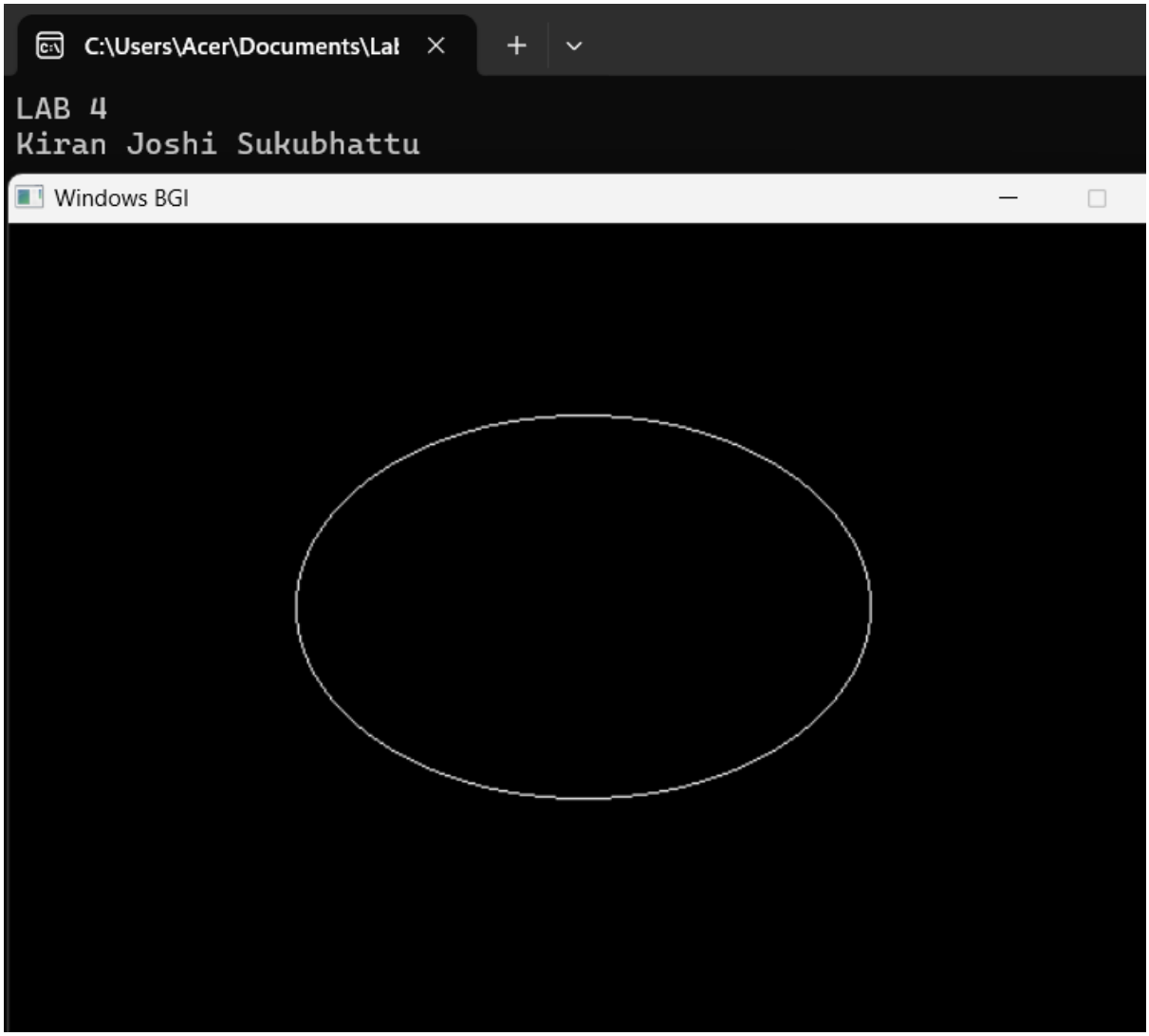


LAB 4: **Mid point circle drawing algorithm to draw ellipse.**

```
#include <iostream>
#include <graphics.h>
using namespace std;

void drawEllipseMidpoint(int xc, int yc, int rx, int ry) {
   int x = 0, y = ry;
   int rx2 = rx * rx;
   int ry2 = ry * ry;
   int twoRx2 = 2 * rx2;
   int twoRy2 = 2 * ry2;
   int p;
   int px = 0;
   int py = twoRx2 * y;

   // Region 1
   p = ry2 - rx2 * ry + 0.25 * rx2;
   while (px < py) {
      putpixel(x + xc, y + yc, WHITE);
      putpixel(-x + xc, y + yc, WHITE);
      putpixel(x + xc, -y + yc, WHITE);
      putpixel(-x + xc, -y + yc, WHITE);

      x++;
      px += twoRy2;
      if (p < 0) {
         p += ry2 + px;
      } else {
         y--;
         py -= twoRx2;
         p += ry2 + px - py;
```

```
        }
    }

    // Region 2
    p = ry2 * (x + 0.5) * (x + 0.5) + rx2 * (y - 1) * (y - 1) - rx2 * ry2;
    while (y >= 0) {
        putpixel(x + xc, y + yc, WHITE);
        putpixel(-x + xc, y + yc, WHITE);
        putpixel(x + xc, -y + yc, WHITE);
        putpixel(-x + xc, -y + yc, WHITE);

        y--;
        py -= twoRx2;
        if (p > 0) {
            p += rx2 - py;
        } else {
            x++;
            px += twoRy2;
            p += rx2 - py + px;
        }
    }
}

int main() {
    cout<<"LAB 4\n";
    cout<<"Kiran Joshi Sukubhattu\n";
    int gd = DETECT, gm;
    initgraph(&gd, &gm, ""); // Initialize graphics mode

    // Coordinates of the center of the ellipse and its radii
    int xc = 300, yc = 200, rx = 150, ry = 100;
```

```
    drawEllipseMidpoint(xc, yc, rx, ry);

    getch(); // Wait for a key press
    closegraph(); // Close graphics mode
    return 0;
}
```



LAB 5: **Implementation of 2-D transformation.**

```
#include <iostream>
#include <complex>
#include <conio.h>
#include <graphics.h>
#include <math.h>
using namespace std;

typedef complex<double> point;
#define x real()
#define y imag()

void displaymenu();
int drawpolygon(point, point, point, point);
point translation(point, int, int);
point scaling(point, int, int);
point rotation(point, int, int, float);
void reflectionmenu();
point reflectionthx(point);
point reflectionthy(point);
point reflectionthymx(point);
point reflectionthyx(point);
point reflectionthline(point, point, point);
void shearingmenu();
point shearingx(point, int);
point shearingy(point, int);
point shearingxy(point, int, int);

int main()
{
```

```
printf("Lab 5\n");
printf("Kiran Joshi Sukubhattu\n");

int gd = DETECT, gm;
point E, F, G, H;

initgraph(&gd, &gm, "C:\\TC\\BGI");
int x1, y1, x2, y2, x3, y3, x4, y4, choice, subchoice, i;

cout << "Enter four coordinates of polygon(one in a single line): ";
cin >> x1 >> y1 >> x2 >> y2 >> x3 >> y3 >> x4 >> y4;

point A(x1, y1);
point B(x2, y2);
point C(x3, y3);
point D(x4, y4);
drawpolygon(A, B, C, D);

displaymenu();
cout << "Enter your choice: ";
cin >> choice;

switch (choice)
{
case 1:
        int a, b;

        cout << "Enter translation distances: ";
        cin >> a >> b;

        E = translation(A, a, b);
```

```
        F = translation(B, a, b);
        G = translation(C, a, b);
        H = translation(D, a, b);
        setcolor(RED);
        drawpolygon(E, F, G, H);
        getch();
        break;

case 2:
        float angle, ang;
        int c, d; // pivot

        cout << "Enter pivot point for rotation: ";
        cin >> c >> d;
        cout << "Enter angle through which u want to rotate: ";
        cin >> ang;

        angle = (ang * 3.14) / 180;
        E = rotation(A, c, d, angle);
        F = rotation(B, c, d, angle);
        G = rotation(C, c, d, angle);
        H = rotation(D, c, d, angle);
        setcolor(RED);
        drawpolygon(E, F, G, H);
        break;

case 3:
        int sx, sy;

        cout << "Enter scaling factors(Sx,Sy): ";
        cin >> sx >> sy;
```

```
        E = scaling(A, sx, sy);
        F = scaling(B, sx, sy);
        G = scaling(C, sx, sy);
        H = scaling(D, sx, sy);
        setcolor(RED);
        drawpolygon(E, F, G, H);
        break;

case 4:
        reflectionmenu();
        cout << "Choose type of reflection..";
        cin >> subchoice;

        switch (subchoice)
        {
        case 1:
                E = reflectionthx(A);
                F = reflectionthx(B);
                G = reflectionthx(C);
                H = reflectionthx(D);

                setcolor(RED);
                drawpolygon(E, F, G, H);
                break;

        case 2:
                E = reflectionthy(A);
                F = reflectionthy(B);
                G = reflectionthy(C);
                H = reflectionthy(D);
```

```
        setcolor(RED);
        drawpolygon(E, F, G, H);
        break;

case 3:
        E = reflectionthyx(A);
        F = reflectionthyx(B);
        G = reflectionthyx(C);
        H = reflectionthyx(D);
        setcolor(RED);
        drawpolygon(E, F, G, H);
        break;

case 4:
        E = reflectionthymx(A);
        F = reflectionthymx(B);
        G = reflectionthymx(C);
        H = reflectionthymx(D);
        setcolor(RED);
        drawpolygon(E, F, G, H);
        break;

case 5:
        int a1, b1, a2, b2;

        cout << "Enter starting and end coordinates of line:";
        cin >> a1 >> b1 >> a2 >> b2;

        point X(a1, b1);
        point Y(a2, b2);
```

```
                E = reflectionthline(A, X, Y);
                F = reflectionthline(B, X, Y);
                G = reflectionthline(C, X, Y);
                H = reflectionthline(D, X, Y);
                setcolor(RED);
                drawpolygon(E, F, G, H);
                break;
        }
        break;

case 5:
        shearingmenu();
        int shx, shy;

        cout << "Choose shearing option:";
        cin >> subchoice;

        switch (subchoice)
        {
        case 1:
                cout << "enter shearing distance: ";
                cin >> shx;
                E = A;
                F = shearingx(B, shx);
                G = shearingx(C, shx);
                H = D;
                setcolor(RED);
                drawpolygon(E, F, G, H);
                break;

        case 2:
```

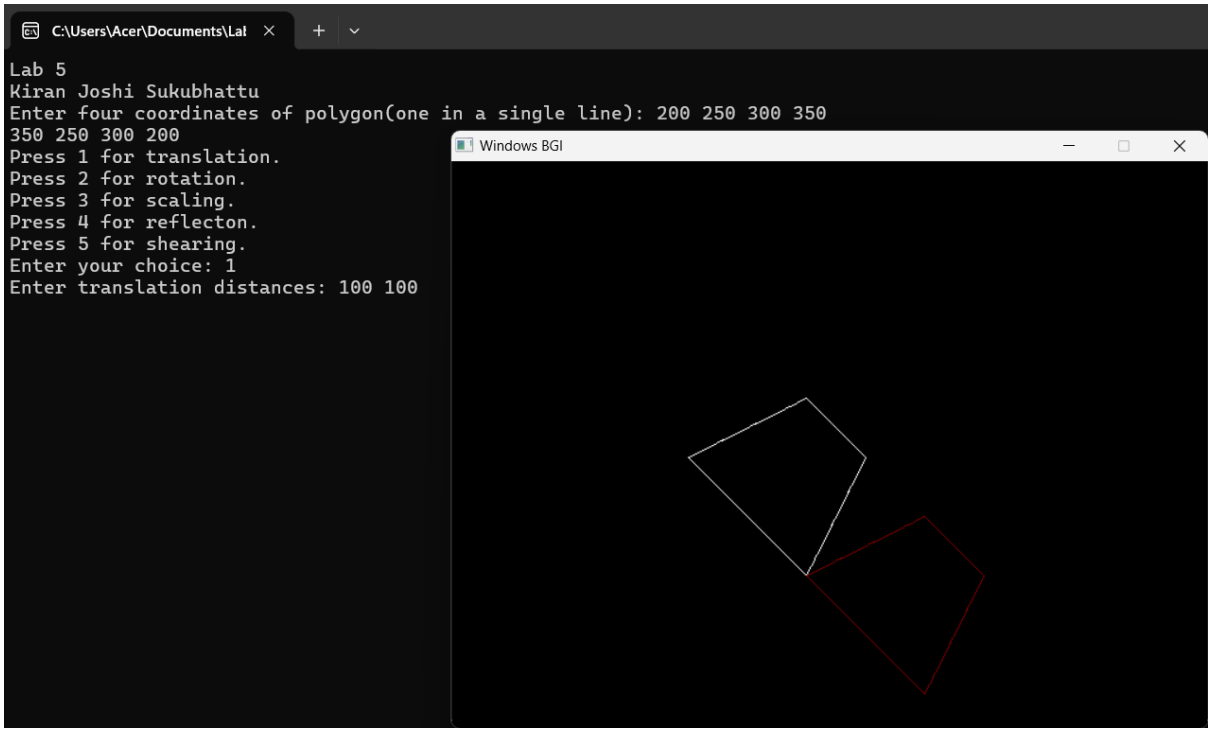
```
                cout << "Enter shearing distance: ";
                cin >> shx;
                E = shearingy(A, shy);
                F = B;
                G = C;
                H = shearingy(D, shy);
                setcolor(RED);
                drawpolygon(E, F, G, H);
                break;

        case 3:
                cout << "Enter x and y shearing distance: ";
                cin >> shx >> shy;
                E = shearingxy(A, shx, shy);
                F = shearingxy(B, shx, shy);
                G = shearingxy(C, shx, shy);
                H = shearingxy(D, shx, shy);
                setcolor(RED);
                drawpolygon(E, F, G, H);
                break;
        }
        break;

default:
        cout << "Invalid Choice..";
        break;
}
getch();
closegraph();

}
```

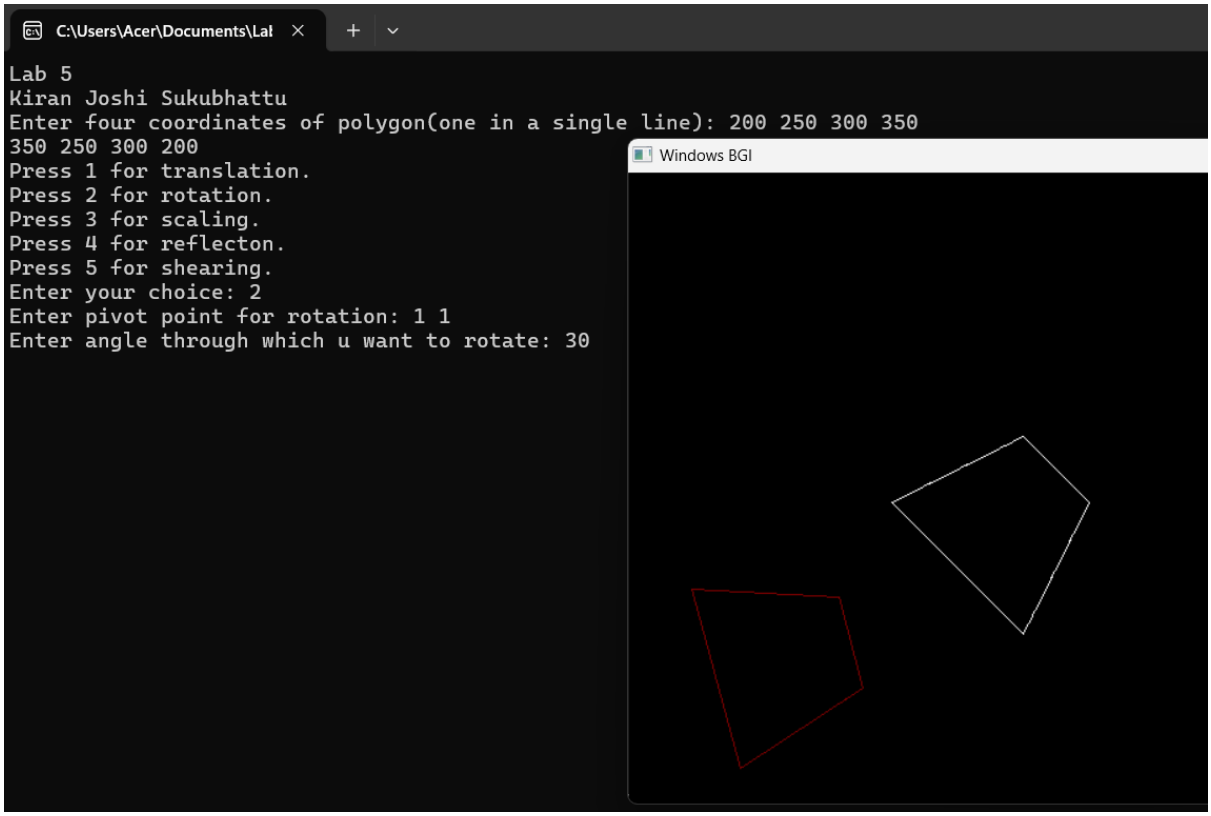
```
void displaymenu()
{
	cout << "Press 1 for translation." << endl;
	cout << "Press 2 for rotation." << endl;
	cout << "Press 3 for scaling." << endl;
	cout << "Press 4 for reflecton." << endl;
	cout << "Press 5 for shearing." << endl;
}

void reflectionmenu()
{
	cout << "press 1 for reflection through x-axis." << endl;
	cout << "press 2 for reflection through y-axis." << endl;
	cout << "press 3 for reflection through line y=x." << endl;
	cout << "press 4 for reflection through line y=-x." << endl;
	cout << "press 5 for reftection through a line" << endl;
}

void shearingmenu()
{
	cout << "press 1 for shearing through x-axis." << endl;
	cout << "press 2 for shearing through y-axis." << endl;
	cout << "press 3 for shearing through xy-axis." << endl;
}

point translation(point A, int a, int b)
{
	point B(A.real() + a, A.imag() + b);
	return B;
}
```

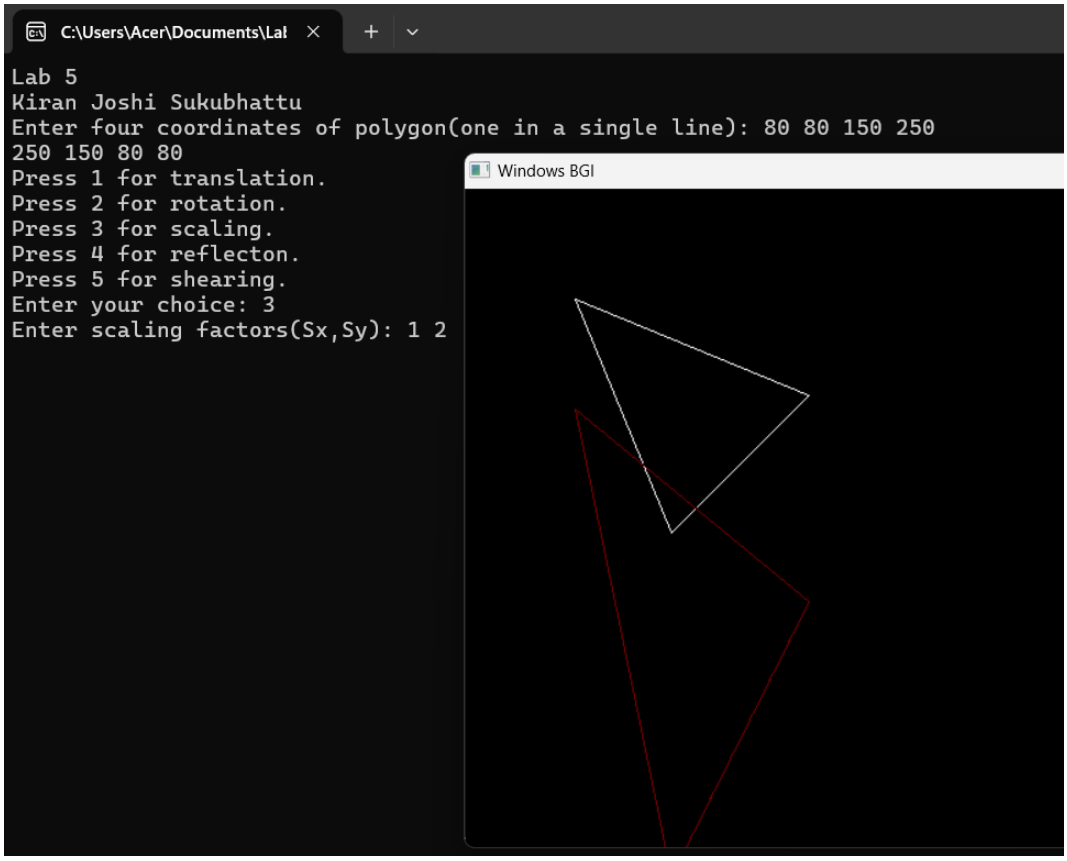
```
point rotation(point A, int a, int b, float angl)
{
	point C = translation(A, -a, -b);
	point B(((C.real() * cos(angl)) - (C.imag() * sin(angl))), ((C.real() * sin(angl)) + (C.imag()) * cos(angl)));
	point D = translation(B, +a, +b);
	return D;
}

point scaling(point A, int a, int b)
{
	point B(A.real() * a, A.imag() * b);
	return B;
}

point reflectionthx(point A)
{
	point C(A.real(), -A.imag());
	point B = translation(C, 0, 600);
	return B;
}

point reflectionthy(point A)
{
	point C(-A.real(), A.imag());
	point B = translation(C, 600, 0);
	return B;
}

point reflectionthyx(point A)
```

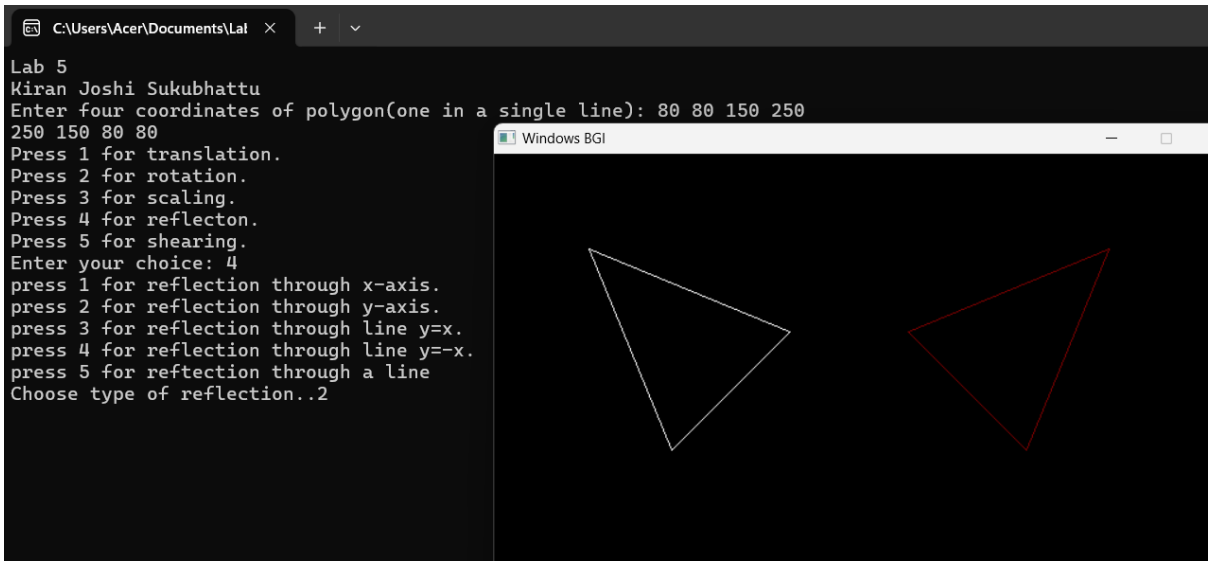
```
{
	int p, q;
	p = A.imag();
	q = A.real();
	point C(p, q);

	return C;
}

point reflectionthymx(point A)
{
	int p, q;
	p = A.imag();
	q = A.real();
	point C(-p, -q);
	point B = translation(C, 500, 500);
	return B;
}

point reflectionthline(point P, point A, point B)
{
	point Pt = P - A;
	point Bt = B - A;
	point Pr = Pt / Bt;
	return conj(Pr) * Bt + A;
}

point shearingx(point A, int shx)
{
	point B(A.real() + shx * A.imag(), A.imag());
	return B;
```

```
}

point shearingy(point A, int shy)
{
        point B(A.real(), A.imag() + shy * A.real());
        return B;
}

point shearingxy(point A, int shx, int shy)
{
        point B((A.real() + shx * A.imag()), (A.imag() + shy * A.real()));
        return B;
}

int drawpolygon(point W, point X, point Y, point Z)
{
        line(W.real(), W.imag(), Z.real(), Z.imag());
        delay(200);
        line(Z.real(), Z.imag(), Y.real(), Y.imag());
        delay(200);
        line(Y.real(), Y.imag(), X.real(), X.imag());
        delay(200);
        line(X.real(), X.imag(), W.real(), W.imag());
        delay(200);
        return 0;
}
```


C:\Users\Acer\Documents\Lal
Lab 5
Kiran Joshi Sukubhattu
Enter four coordinates of polygon(one in a single line): 200 250 300 350
350 250 300 200
Press 1 for translation.
Press 2 for rotation.
Press 3 for scaling.
Press 4 for reflecton.
Press 5 for shearing.
Enter your choice: 1
Enter translation distances: 100 100
Windows BGI


C:\Users\Acer\Documents\Lal
Lab 5
Kiran Joshi Sukubhattu
Enter four coordinates of polygon(one in a single line): 200 250 300 350
350 250 300 200
Press 1 for translation.
Press 2 for rotation.
Press 3 for scaling.
Press 4 for reflecton.
Press 5 for shearing.
Enter your choice: 2
Enter pivot point for rotation: 1 1
Enter angle through which u want to rotate: 30
Windows BGI

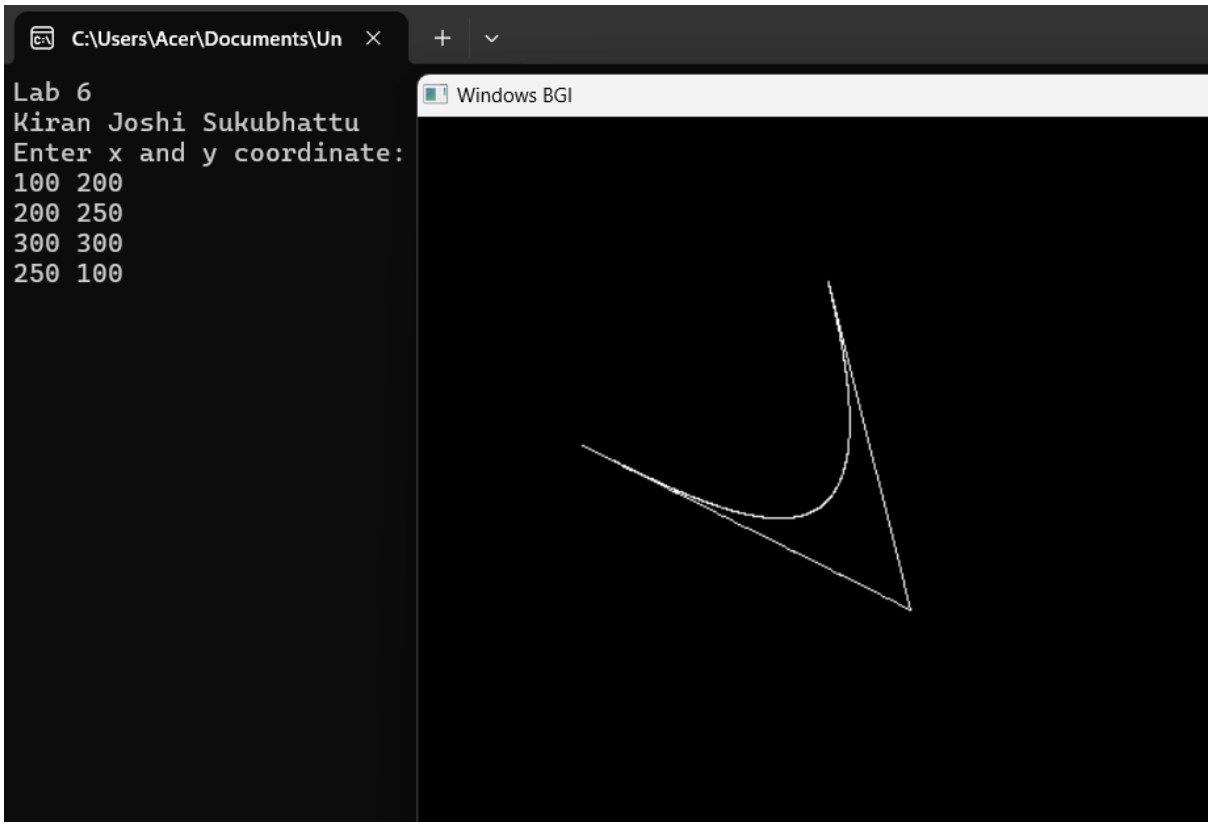

C:\Users\Acer\Documents\Lal
Lab 5
Kiran Joshi Sukubhattu
Enter four coordinates of polygon(one in a single line): 80 80 150 250
250 150 80 80
Press 1 for translation.
Press 2 for rotation.
Press 3 for scaling.
Press 4 for reflecton.
Press 5 for shearing.
Enter your choice: 3
Enter scaling factors(Sx,Sy): 1 2
Windows BGI


C:\Users\Acer\Documents\Lal
Lab 5
Kiran Joshi Sukubhattu
Enter four coordinates of polygon(one in a single line): 80 80 150 250
250 150 80 80
Press 1 for translation.
Press 2 for rotation.
Press 3 for scaling.
Press 4 for reflecton.
Press 5 for shearing.
Enter your choice: 4
press 1 for reflection through x-axis.
press 2 for reflection through y-axis.
press 3 for reflection through line y=x.
press 4 for reflection through line y=-x.
press 5 for reftection through a line
Choose type of reflection..2
Windows BGI

LAB 6: **Bezier curve implementation.**

```
#include <iostream>
#include <math.h>
#include <graphics.h>

using namespace std;

int main()
{
        printf("Lab 6\n");
        printf("\nKiran Joshi Sukubhattu\n");
   int x[4],y[4],i;
   double put_x,put_y,t;

        int gr=DETECT,gm;
        initgraph (&gr,&gm,(char*)"");

        printf("Enter x and y coordinate:\n");

        for (i=0;i<4;i++)
        {
                scanf("%d%d",&x[i],&y[i]);

        }
        for (i=0;i<3;i++)
        {
                line (x[i],y[i],x[i+1],y[i+1]);
        }

        for (t=0.0;t<=1.0;t=t+0.001)
        {
```

```
            put_x=pow(1-t,3)*x[0]+3*t*pow(1-t,2)*x[1]+3*t*t*(1-t)*x[2]+pow(t,3)*x[3];
            put_y=pow(1-t,3)*y[0]+3*t*pow(1-t,2)*y[1]+3*t*t*(1-t)*y[2]+pow(t,3)*y[3];
            putpixel(put_x,put_y,WHITE);
        }

   getch();
   closegraph();

}
```

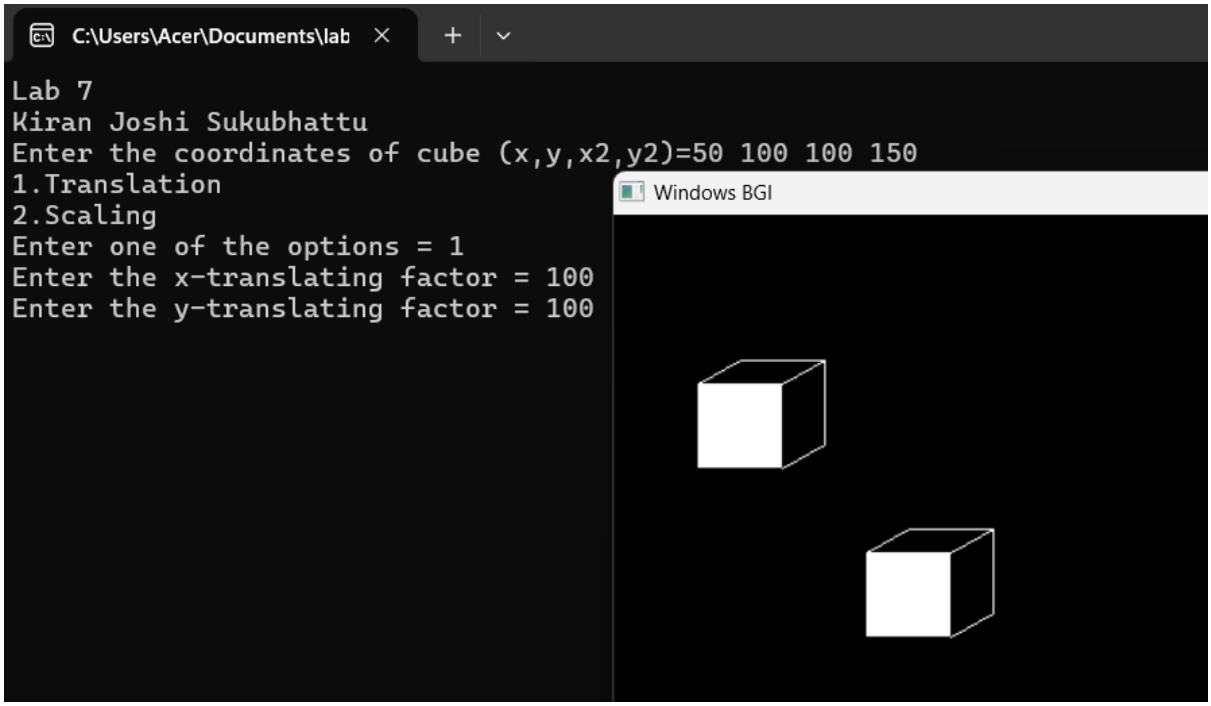


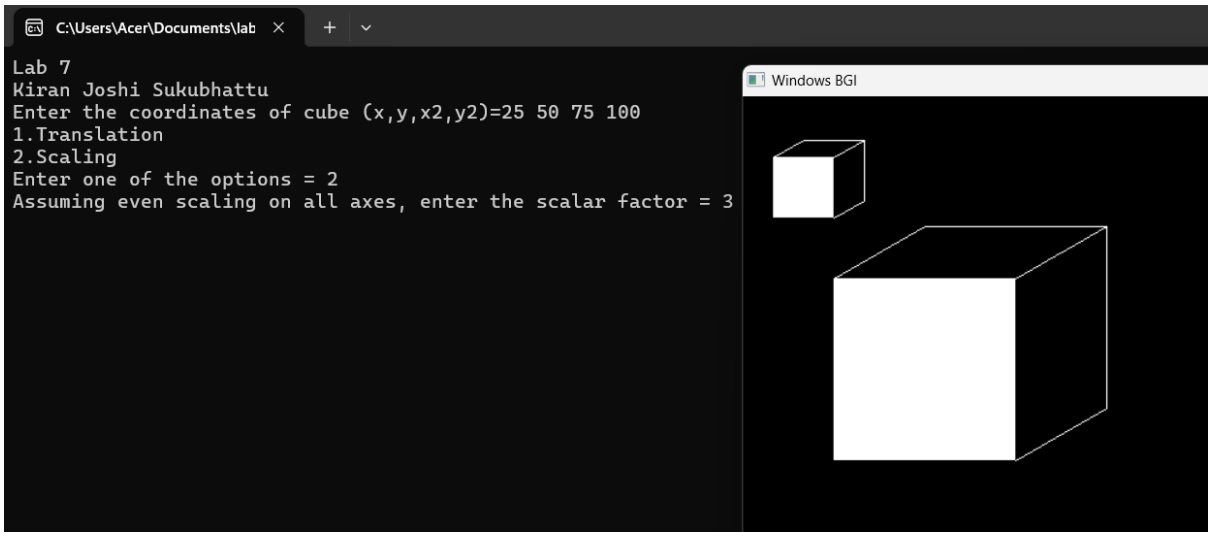
LAB 7: **Implementation of 3-D Transformation.**

```
#include<stdio.h>
#include<math.h>
#include<conio.h>
#include<graphics.h>
#include<stdlib.h>

int translation(int x, int tx) {
   return (x + tx);
}

int scalar(int k, int x) {
   return (k * x);
}

int main() {
printf("Lab 7\n");
printf("Kiran Joshi Sukubhattu\n");
   int gd = DETECT, gm;
   initgraph(&gd, &gm, (char *)" ");
   printf("Enter the coordinates of cube (x,y,x2,y2)=");
   int left, right, bottom, top, depth;
   scanf("%d%d%d%d", &left, &top, &right, &bottom);
   depth = fabs((right - left) / 2);
   bar3d(left, top, right, bottom, depth, 1);

   printf("1.Translation \n2.Scaling \n");
   printf("Enter one of the options = ");
   int option;
   scanf("%d", &option);
   switch(option) {
```

```
case 1: {
   printf("Enter the x-translating factor = ");
   int tx;
   scanf("%d", &tx);
   left = translation(left, tx);
   right = translation(right, tx);
   printf("Enter the y-translating factor = ");
   int ty;
   scanf("%d", &ty);
   top = translation(top, ty);
   bottom = translation(bottom, ty);
   depth = fabs((right - left) / 2);
   bar3d(left, top, right, bottom, depth, 1);
   getch();
   break;
}
case 2: {
   printf("Assuming even scaling on all axes, enter the scalar factor = ");
   int scale;
   scanf("%d", &scale);
   left = scalar(left, scale);
   right = scalar(right, scale);
   top = scalar(top, scale);
   bottom = scalar(bottom, scale);
   depth = fabs((right - left) / 2);
   bar3d(left, top, right, bottom, depth, 1);
   getch();
   break;
}
default: {
   printf("Invalid selection!\n");
```

```
        break;
      }
   }
   closegraph();
   getch();
}
```





LAB 8: **Implementation Cohen-Sutherland line clipping algorithm.**

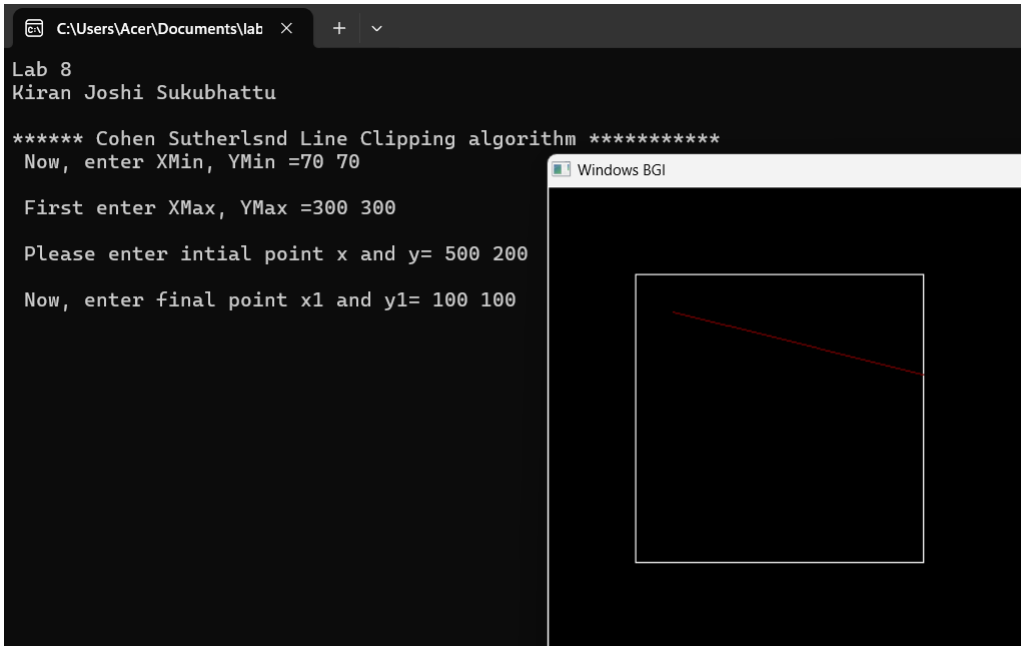
```
#include <graphics.h>
#include <conio.h>
#include <stdio.h>
#include <math.h>

int main()
{
printf("Lab 8\n");
printf("Kiran Joshi Sukubhattu\n");
   int rcode_begin[4] = {0, 0, 0, 0}, rcode_end[4] = {0, 0, 0, 0}, region_code[4];
   int W_xmax, W_ymax, W_xmin, W_ymin, flag = 0;
   float slope;
   int x, y, x1, y1, i, xc, yc;
   int gr = DETECT, gm;
   initgraph(&gr, &gm, "C:\\TURBOC3\\BGI");
   printf("\n****** Cohen Sutherlsnd Line Clipping algorithm **********");
   printf("\n Now, enter XMin, YMin =");

   scanf("%d %d", &W_xmin, &W_ymin);
   printf("\n First enter XMax, YMax =");
   scanf("%d %d", &W_xmax, &W_ymax);
   printf("\n Please enter intial point x and y= ");
   scanf("%d %d", &x, &y);
   printf("\n Now, enter final point x1 and y1= ");
   scanf("%d %d", &x1, &y1);

   cleardevice();
   rectangle(W_xmin, W_ymin, W_xmax, W_ymax);
   line(x, y, x1, y1);
   line(0, 0, 600, 0);
```

```
line(0, 0, 0, 600);
if (y > W_ymax)
{
   rcode_begin[0] = 1; // Top
   flag = 1;
}
if (y < W_ymin)
{
   rcode_begin[1] = 1; // Bottom
   flag = 1;
}
if (x > W_xmax)
{
   rcode_begin[2] = 1; // Right
   flag = 1;
}
if (x < W_xmin)
{
   rcode_begin[3] = 1; // Left
   flag = 1;
}

// end point of Line
if (y1 > W_ymax)
{
   rcode_end[0] = 1; // Top
   flag = 1;
}
if (y1 < W_ymin)
{
   rcode_end[1] = 1; // Bottom
```

```
    flag = 1;
}
if (x1 > W_xmax)
{
    rcode_end[2] = 1; // Right
    flag = 1;
}
if (x1 < W_xmin)
{
    rcode_end[3] = 1; // Left
    flag = 1;
}
if (flag == 0)
{
    printf("No need of clipping as it is already in window");
}
flag = 1;
for (i = 0; i < 4; i++)
{
    region_code[i] = rcode_begin[i] && rcode_end[i];
    if (region_code[i] == 1)
        flag = 0;
}
if (flag == 0)
{
    printf("\n Line is completely outside the window");
}
else
{
    slope = (float)(y1 - y) / (x1 - x);
    if (rcode_begin[2] == 0 && rcode_begin[3] == 1) // left
```

```
{
   y = y + (float)(W_xmin - x) * slope;
   x = W_xmin;
}
if (rcode_begin[2] == 1 && rcode_begin[3] == 0) // right
{
   y = y + (float)(W_xmax - x) * slope;
   x = W_xmax;
}
if (rcode_begin[0] == 1 && rcode_begin[1] == 0) // top
{
   x = x + (float)(W_ymax - y) / slope;
   y = W_ymax;
}
if (rcode_begin[0] == 0 && rcode_begin[1] == 1) // bottom
{
   x = x + (float)(W_ymin - y) / slope;
   y = W_ymin;
}
// end points
if (rcode_end[2] == 0 && rcode_end[3] == 1) // left
{
   y1 = y1 + (float)(W_xmin - x1) * slope;
   x1 = W_xmin;
}
if (rcode_end[2] == 1 && rcode_end[3] == 0) // right
{
   y1 = y1 + (float)(W_xmax - x1) * slope;
   x1 = W_xmax;
}
if (rcode_end[0] == 1 && rcode_end[1] == 0) // top
```

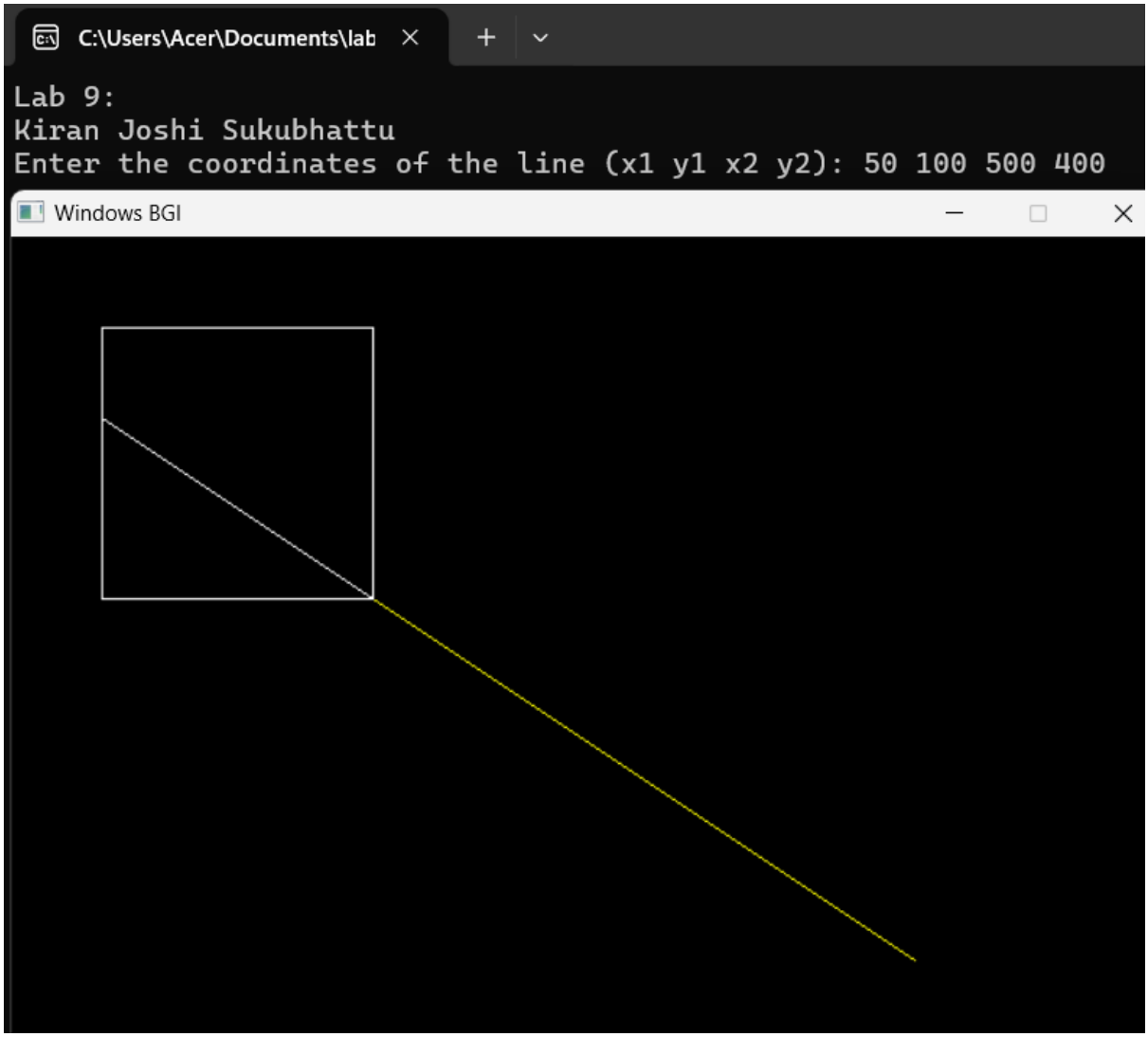
```
    {
      x1 = x1 + (float)(W_ymax - y1) / slope;
      y1 = W_ymax;
    }
    if (rcode_end[0] == 0 && rcode_end[1] == 1) // bottom
    {
      x1 = x1 + (float)(W_ymin - y1) / slope;
      y1 = W_ymin;
    }
  }
  delay(1000);
  clearviewport();
  rectangle(W_xmin, W_ymin, W_xmax, W_ymax);
  line(0, 0, 600, 0);
  line(0, 0, 0, 600);
  setcolor(RED);
  line(x, y, x1, y1);
  getch();
  closegraph();
}
```



LAB 9: **Implementation of Liang-Barsky algorithm.**

```
#include <stdio.h>
#include <graphics.h>

void liangBarsky(int x1, int y1, int x2, int y2, int xmin, int ymin, int xmax, int ymax) {
   float t1 = 0, t2 = 1;
   int dx = x2 - x1, dy = y2 - y1;
   int p[4] = {-dx, dx, -dy, dy};
   int q[4] = {x1 - xmin, xmax - x1, y1 - ymin, ymax - y1};

   for (int i = 0; i < 4; i++) {
      if (p[i] == 0 && q[i] < 0) {
         printf("Line is parallel to clipping window and outside of it\n");
         return;
      }
      float t = (float)q[i] / p[i];
      if (p[i] < 0) {
         if (t > t1) t1 = t;
      } else if (p[i] > 0) {
         if (t < t2) t2 = t;
      }
   }

   if (t1 < t2) {
      int x1_new = x1 + t1 * dx;
      int y1_new = y1 + t1 * dy;
      int x2_new = x1 + t2 * dx;
      int y2_new = y1 + t2 * dy;

      setcolor(WHITE);
      line(x1_new, y1_new, x2_new, y2_new);
```

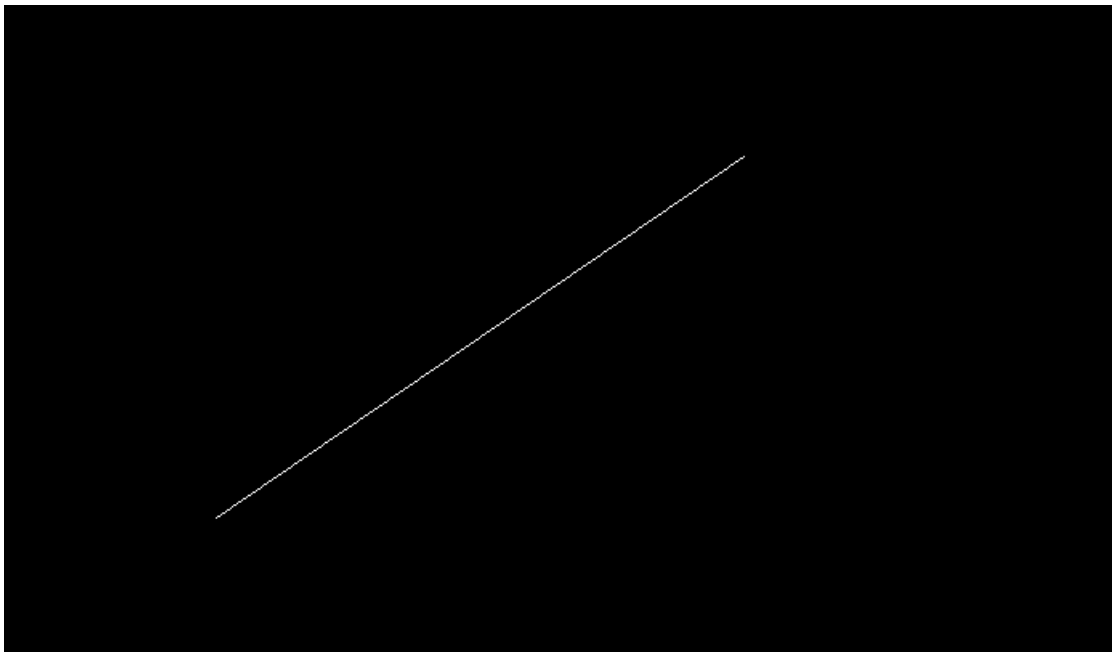
```
    } else {
        printf("Line lies completely outside the clipping window\n");
    }
}

int main() {
    printf("Lab 9:");
    printf("\nKiran Joshi Sukubhattu\n");
    int gd = DETECT, gm;
    initgraph(&gd, &gm, NULL);

    // Clipping window coordinates
    int xmin = 50, ymin = 50, xmax = 200, ymax = 200;
    rectangle(xmin, ymin, xmax, ymax);

    // Line coordinatess
    int x1, y1, x2, y2;
    printf("Enter the coordinates of the line (x1 y1 x2 y2): ");
    scanf("%d %d %d %d", &x1, &y1, &x2, &y2);

    setcolor(YELLOW);
    line(x1, y1, x2, y2);

    liangBarsky(x1, y1, x2, y2, xmin, ymin, xmax, ymax);

    getch();
    closegraph();

    return 0;
}
```


C:\Users\Acer\Documents\lab
Lab 9:
Kiran Joshi Sukubhattu
Enter the coordinates of the line (x1 y1 x2 y2): 50 100 500 400
Windows BGI

LAB 11: **Draw a line using OpenGL.**

```
#include <windows.h>
#include <GL/glut.h>

void init(void);
void lineSegment(void);

// driver program
int main(int argc, char **argv)
{
   printf("Lab 11:");
   printf("\nKiran Joshi Sukubhattu\n");
   glutInit(&argc, argv);
   glutInitWindowSize(700, 700);      // whole window size initialize
   glutInitWindowPosition(100, 100); // window position initialize
   glutInitDisplayMode(GLUT_SINGLE | GLUT_RGB);
   glutCreateWindow("Line");
   init();
   glutDisplayFunc(lineSegment);
   glutMainLoop();
   return EXIT_SUCCESS;
}

void init(void)
{
   glClearColor(1.0, 10.0, 100.0, 0.0);
   glMatrixMode(GL_PROJECTION);
   gluOrtho2D(0.0, 200.0, 0.0, 150.0);
}
```

```
void lineSegment(void)
{
   glClear(GL_COLOR_BUFFER_BIT);
   glColor3f(0.0, 0.0, 0.0);
   // GL_POINTS, GL_LINES, GL_LINE_STRIP, GL_LINE_LOOP, GL_TRIANGLES, GL_TRIANGLE_STRIP,
GL_TRIANGLE_FAN, GL_QUADS, GL_QUAD_STRIP, and GL_POLYGON
   glBegin(GL_LINES);
   glVertex2i(180, 15);
   glVertex2i(10, 145);
   glEnd();
   glFinish();
}
```



LAB 12: **Draw a triangle using OpenGL**

```
#include <GL/glut.h>

void init(void)
{
   glClearColor(1.0, 1.0, 1.0, 0.0); // last value is alpha (transparency)
   glMatrixMode(GL_PROJECTION);
   gluOrtho2D(0.0, 200.0, 0.0, 150.0); // orthographic projection
}

void triangle(void)
{
   glClear(GL_COLOR_BUFFER_BIT);
   glBegin(GL_POLYGON);
   glVertex3f(0.5, 0.0, 0.5);
   glVertex3f(0.5, 0.0, 0.0);
   glVertex3f(0.0, 0.5, 0.0);
   glVertex3f(0.0, 0.0, 0.5);
   glEnd();
   glFlush();
}

int main(int argc, char **argv)
{
   printf("Lab 12:");
   printf("\nKiran Joshi Sukubhattu\n");
   glutInit(&argc, argv);
   glutInitDisplayMode(GLUT_RGB | GLUT_SINGLE); // Single frame buffer
   glutInitWindowSize(400, 300);
   glutInitWindowPosition(100, 100);
   glutCreateWindow("Triangle");
```

```
    glutDisplayFunc(triangle);
    glutMainLoop();
    return 0;
}
```