Practical No:5

1) **Implement Cohen Sutherland polygon clipping method to clip the polygon with respect the viewport and window. Use mouse click, keyboard interface.**

Code:

```
#include <iostream>

#include <math.h>

#include <time.h>

#include <GL/glut.h>

using namespace std;

int wxmin = 200,wxmax=500,wymax=350, wymin=100;

int points[10][2];

int edge;

void init(){

   glClearColor(1.0,1.0,1.0,0.0);

   glMatrixMode(GL_PROJECTION);

   gluOrtho2D(0,640,0,480);

   glClear(GL_COLOR_BUFFER_BIT);

}

void Draw(){

   glClearColor(1.0,1.0,1.0,0.0);

   glClear(GL_COLOR_BUFFER_BIT);

   glColor3f(0.2,0.2,1);

   glBegin(GL_POLYGON);

      for(int i=0; i<edge; i++)

      {

         glVertex2i(points[i][0],points[i][1]);

      }
```

```
    glEnd();
    glFlush();
    glColor3f(0,1,0);
    glBegin(GL_LINE_LOOP);
    glVertex2i(200,100);
    glVertex2i(500,100);
    glVertex2i(500,350);
    glVertex2i(200,350);
    glEnd();
    glFlush();
}
int BottomCliping(int e){
float m=0;
int x=0,k=0;
int t[10][2];
    for(int i=0; i<e; i++){
        if(points[i][1] < wymin){
            if(points[i+1][1]  < wymin){
            }
            else if(points[i+1][1] > wymin){
                float x1,x2;
                float y1,y2;
                x1 = points[i][0];
                y1 = points[i][1];
                x2 = points[i+1][0];
                y2 = points[i+1][1];
                x = ((1/((y2-y1)/(x2-x1))) * (wymin - y1) )+ x1;
                t[k][0] = x;
                t[k][1] = wymin;
                k++;
            }
        }
        else if(points[i][1]>wymin){
            if(points[i+1][1] > wymin){
                t[k][0] = points[i][0];
                t[k][1] = points[i][1];
                k++;
            }
            else if(points[i+1][1] < wymin){
                float x1,x2;
                float y1,y2;
                x1 = points[i][0];
                y1 = points[i][1];
                x2 = points[i+1][0];
                y2 = points[i+1][1];
                x = ((1/((y2-y1)/(x2-x1))) * (wymin - y1) )+ x1;
                t[k][0] = x1;
                t[k][1] = y1;
                k++;
                t[k][0] = x;
                t[k][1] = wymin;
                k++;
            }
        }
    }
    cout<<"k = "<<k;
```

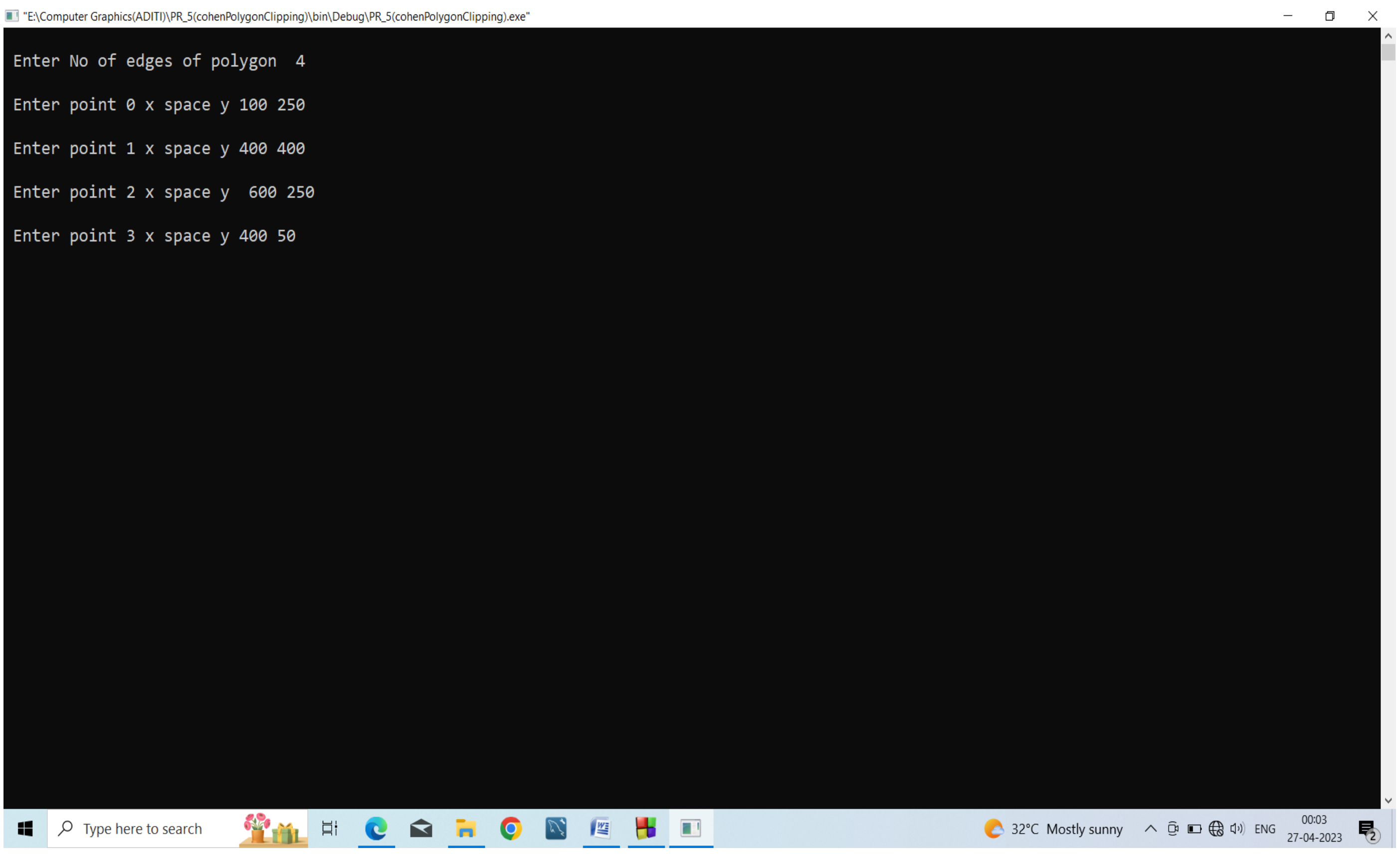
```
    for(int i=0; i<10;i++)
    {
        points[i][0] = 0;
        points[i][1] = 0;
    }
    for(int i=0; i<k;i++)
    {
        cout<<"\n"<<t[i][0]<<" "<<t[i][1];
        points[i][0] = t[i][0];
        points[i][1] = t[i][1];
    }
    points[k][0] = points[0][0];
    points[k][1] = points[0][1];
    return k;
}




int TopCliping(int e){
float m=0;
int x=0,k=0;
int t[10][2];
    for(int i=0; i<e; i++){
        if(points[i][1] > wymax){
            if(points[i+1][1]  > wymax){
            }
        else if(points[i+1][1] < wymax){
            float x1,x2;
            float y1,y2;
            x1 = points[i][0];
            y1 = points[i][1];
            x2 = points[i+1][0];
            y2 = points[i+1][1];
            x = ((1/((y2-y1)/(x2-x1))) * (wymax - y1) )+ x1;
            t[k][0] = x;
            t[k][1] = wymax;
            k++;
        }
    }
    else if(points[i][1]<wymax){
        if(points[i+1][1] < wymax){
            t[k][0] = points[i][0];
            t[k][1] = points[i][1];
            k++;
        }
        else if(points[i+1][1] > wymax){
            float x1,x2;
            float y1,y2;
            x1 = points[i][0];
            y1 = points[i][1];
            x2 = points[i+1][0];
            y2 = points[i+1][1];
            x = ((1/((y2-y1)/(x2-x1))) * (wymax - y1) )+ x1;
            t[k][0] = x1;
            t[k][1] = y1;
            k++;
            t[k][0] = x;
            t[k][1] = wymax;
            k++;
         }
      }
   }
   cout<<"k = "<<k;
   for(int i=0; i<10;i++)
   {
      points[i][0] = 0;
      points[i][1] = 0;
   }

   for(int i=0; i<k;i++)
   {
      cout<<"\n"<<t[i][0]<<" "<<t[i][1];
      points[i][0] = t[i][0];
      points[i][1] = t[i][1];
   }
   points[k][0] = points[0][0];
   points[k][1] = points[0][1];
   return k;
}
int leftCliping(int e){
float m=0;
int y=0, k = 0;
int t[10][2];
   for(int i=0;i<e;i++)
   {
      if(points[i][0] < wxmin){
         if(points[i+1][0] < wxmin){
            cout<<"\n Test 1";
         }
         else if (points[i+1][0] > wxmin){
            cout<<"\n Test 2";
            float x1,x2;
            float y1,y2;
            x1 = points[i][0];
            y1 = points[i][1];
            x2 = points[i+1][0];
            y2 = points[i+1][1];
            y = (((y2-y1)/(x2-x1)) * (wxmin - x1) )+ y1;
            t[k][0] = wxmin;
            t[k][1] = y;
            k++;
         }
      }
      else if(points[i][0] > wxmin){
         if(points[i+1][0] > wxmin){
            t[k][0] = points[i][0];
            t[k][1] = points[i][1];
            k++;
         }
         else if(points[i+1][0] < wxmin){
            float x1,x2;

            float y1,y2;

            x1 = points[i][0];

            y1 = points[i][1];

            x2 = points[i+1][0];

            y2 = points[i+1][1];

            y = ((y2-y1)/(x2-x1)*(wxmin - x1)) + y1;

            t[k][0] = x1;

            t[k][1] = y1;

            k++;

            t[k][0] = wxmin;

            t[k][1] = y;

            k++;

        }

    }

}

cout<<"k = "<<k;

for(int i=0; i<10;i++)

{

    points[i][0] = 0;

    points[i][1] = 0;

}

for(int i=0; i<k;i++)

{

    cout<<"\n"<<t[i][0]<<" "<<t[i][1];

    points[i][0] = t[i][0];

    points[i][1] = t[i][1];

}
```

```
  points[k][0] = points[0][0];

  points[k][1] = points[0][1];

  return k;

}

int RightCliping(int e){

float m=0;

int y=0, k = 0;

int t[10][2];

  for(int i=0;i<e;i++)

  {


    if(points[i][0] > wxmax){

      if(points[i+1][0] > wxmax){

      }

      else if(points[i+1][0] < wxmax){

        float x1,x2;

        float y1,y2;

        x1 = points[i][0];

        y1 = points[i][1];

        x2 = points[i+1][0];

        y2 = points[i+1][1];

        y = (((y2-y1)/(x2-x1)) * (wxmax - x1) )+ y1;

        t[k][0] = wxmax;

        t[k][1] = y;

        k++;

      }

    }

    else if(points[i][0] < wxmax){
        if(points[i+1][0] < wxmax){
           t[k][0] = points[i][0];
           t[k][1] = points[i][1];
           k++;
        }
        else if(points[i+1][0] > wxmax){

           float x1,x2;
           float y1,y2;
           x1 = points[i][0];
           y1 = points[i][1];
           x2 = points[i+1][0];
           y2 = points[i+1][1];
           y = ((y2-y1)/(x2-x1)*(wxmax - x1)) + y1;
           t[k][0] = x1;
           t[k][1] = y1;
           k++;
           t[k][0] = wxmax;
           t[k][1] = y;
           k++;
        }
     }
  }
  cout<<"k = "<<k;
  for(int i=0; i<10;i++)
  {
     points[i][0] = 0;
     points[i][1] = 0;
```

```
    }
    for(int i=0; i<k;i++)
    {
        cout<<"\n"<<t[i][0]<<" "<<t[i][1];
        points[i][0] = t[i][0];
        points[i][1] = t[i][1];


    }
    points[k][0] = points[0][0];
    points[k][1] = points[0][1];
    return k;
}
void P_C(){
    Draw();
}
void goMenu(int value){
    switch(value){
        case 1:
            edge = leftCliping(edge);
            Draw();
            break;
        case 2:
            edge = RightCliping(edge);
            Draw();
            break;
        case 3:
            edge = TopCliping(edge);
            Draw();
```

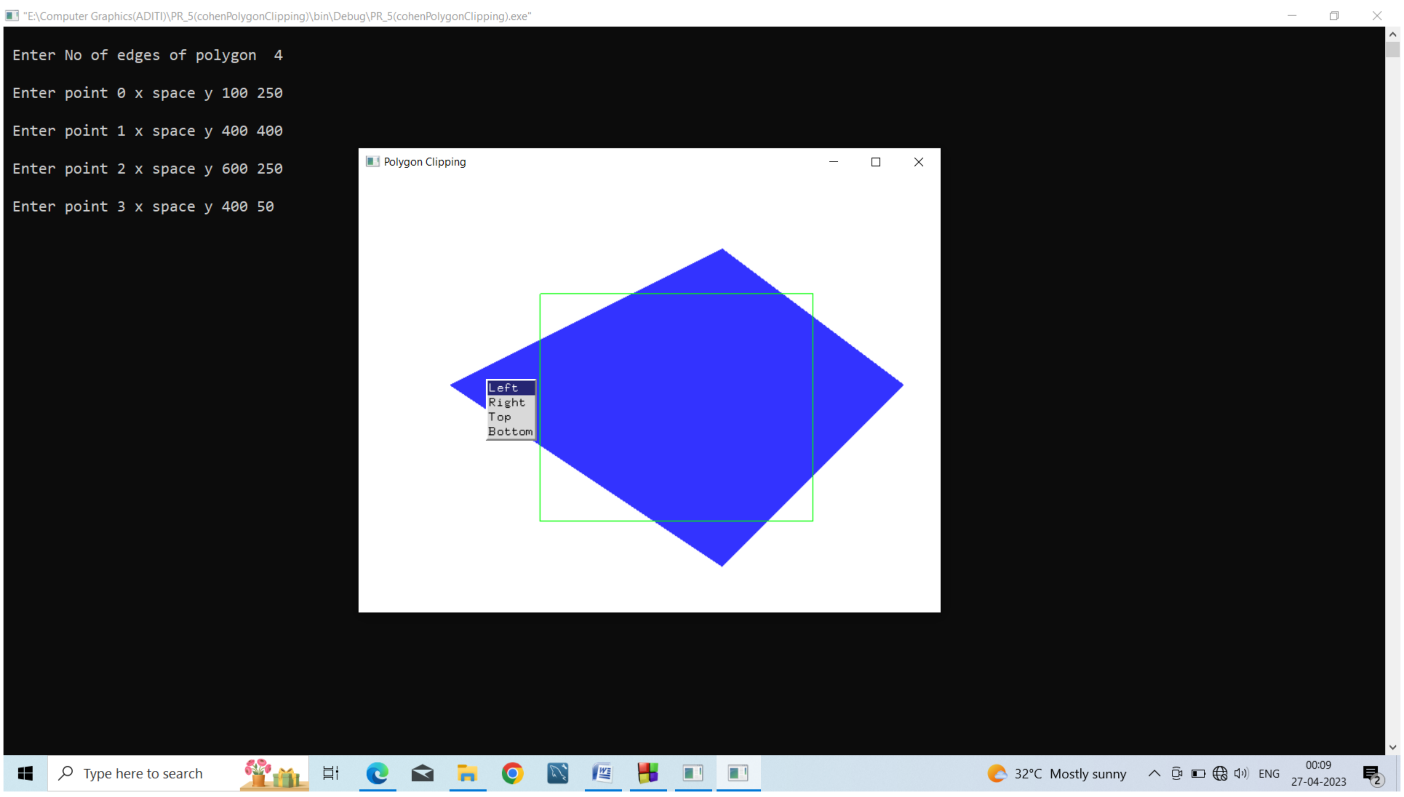
```
          break;
        case 4:
          edge = BottomCliping(edge);
          Draw();
          break;
    }
    glutPostRedisplay();
}
int main(int argc, char** argv){
    cout<<"\n Enter No of edges of polygon  ";
    cin>>edge;
    for(int i=0;i<edge;i++){
        cout<<"\n Enter point "<<i<<" x space y ";
        cin>>points[i][0]>>points[i][1];
    }
    points[edge][0] = points[0][0];
    points[edge][1] = points[0][1];
    glutInit(&argc, argv);
    glutInitDisplayMode(GLUT_SINGLE|GLUT_RGB);
    glutInitWindowSize(640,480);
    glutInitWindowPosition(200,200);
    glutCreateWindow("Polygon Clipping");
    init();
    glutCreateMenu(goMenu);
         glutAddMenuEntry("Left",1);
         glutAddMenuEntry("Right",2);
         glutAddMenuEntry("Top",3);
         glutAddMenuEntry("Bottom",4);
        glutAttachMenu(GLUT_RIGHT_BUTTON);


       glutDisplayFunc(P_C);

    glutMainLoop();

    return 0;

}
```

Output:



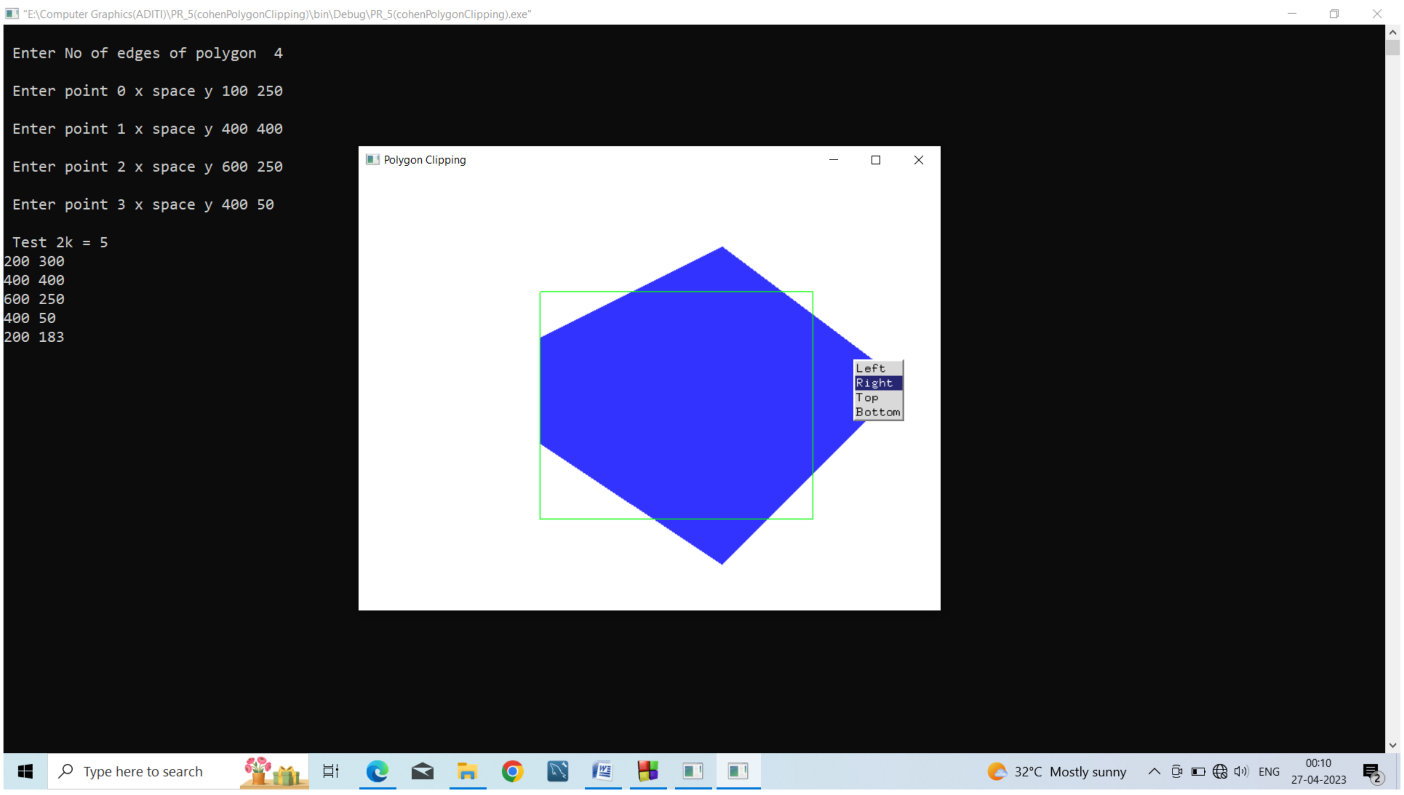
"E:\Computer Graphics(ADITI)\PR_5(cohenPolygonClipping)\bin\Debug\PR_5(cohenPolygonClipping).exe"

```
Enter No of edges of polygon  4

Enter point 0 x space y 100 250

Enter point 1 x space y 400 400

Enter point 2 x space y  600 250

Enter point 3 x space y 400 50
```



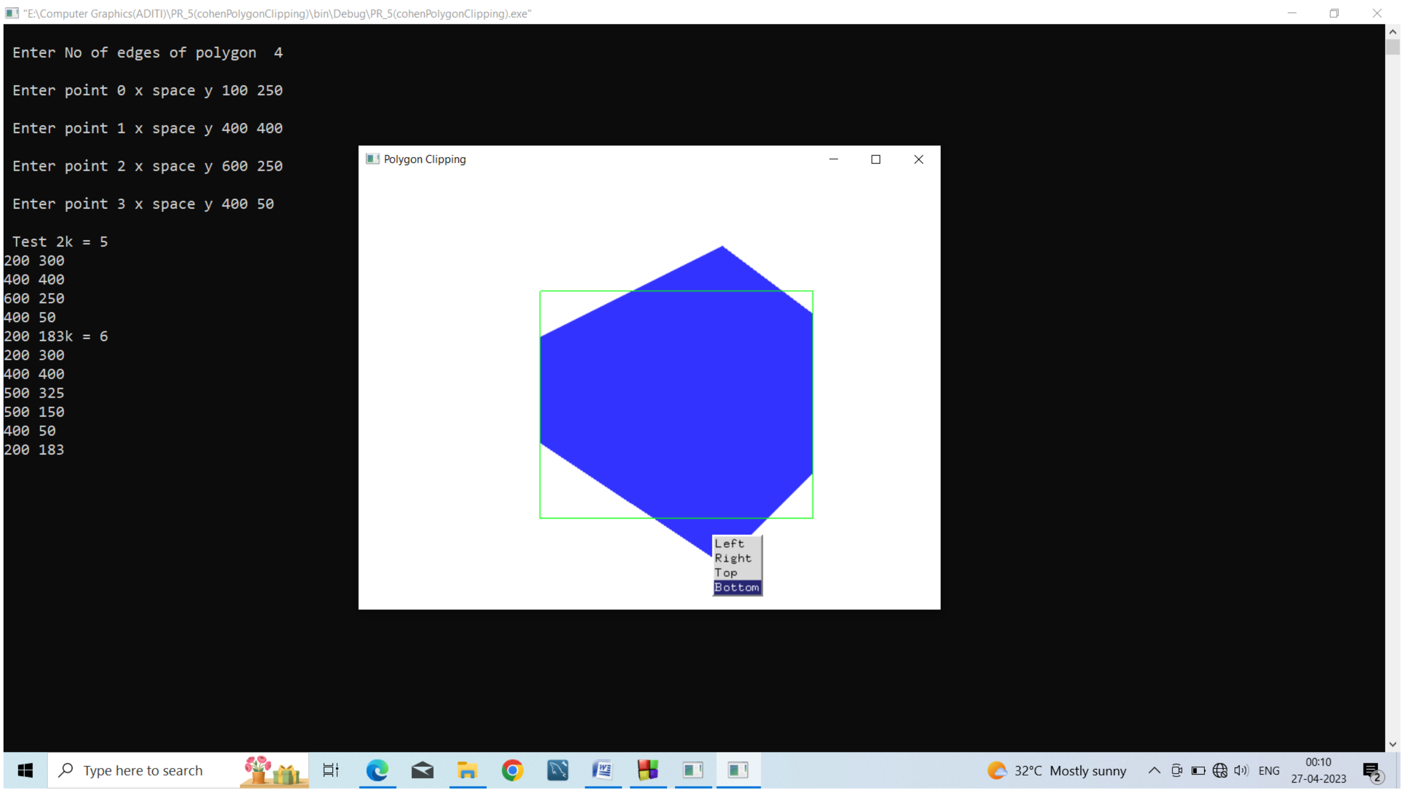
"E:\Computer Graphics(ADITI)\PR_5(cohenPolygonClipping)\bin\Debug\PR_5(cohenPolygonClipping).exe"

```
Enter No of edges of polygon  4

Enter point 0 x space y 100 250

Enter point 1 x space y 400 400

Enter point 2 x space y 600 250

Enter point 3 x space y 400 50
```



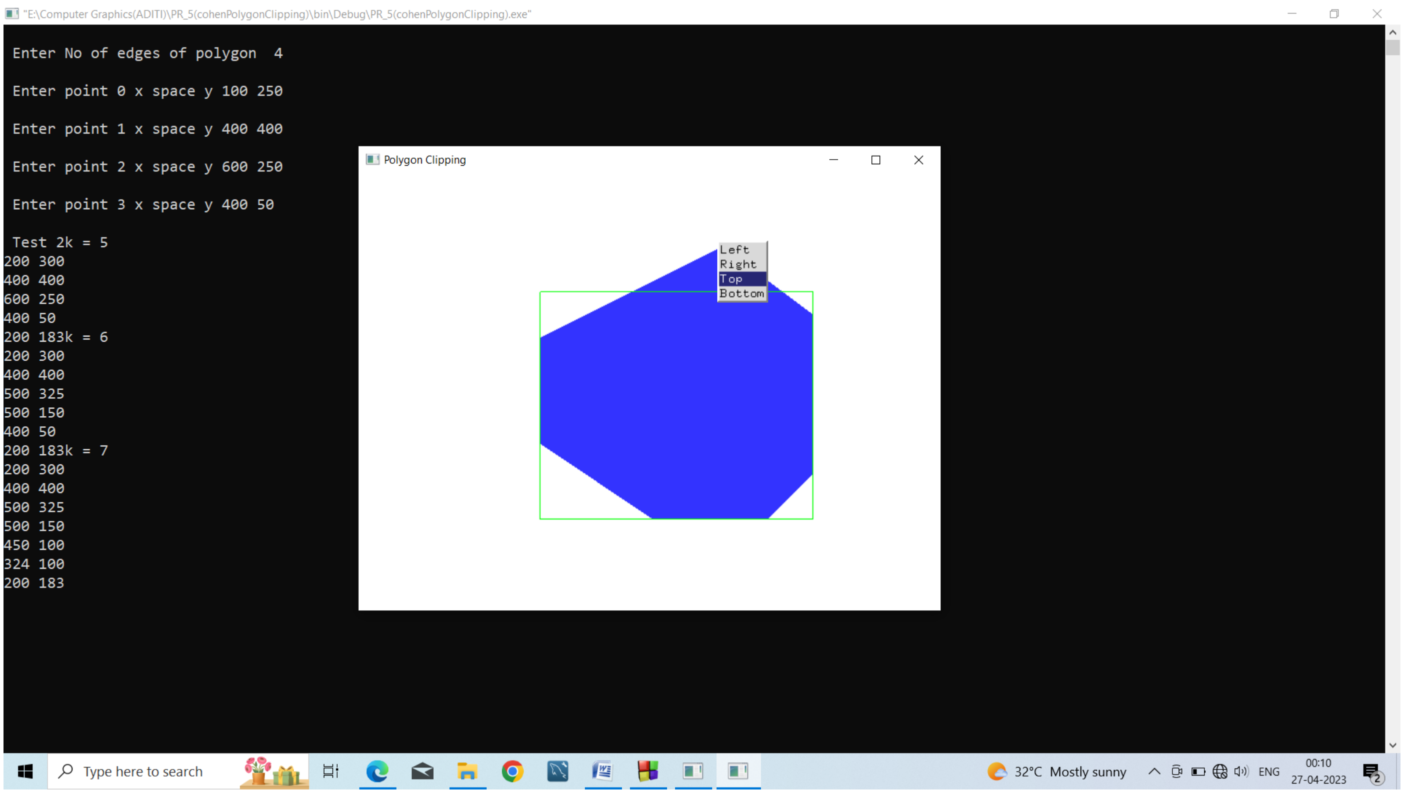
"E:\Computer Graphics(ADITI)\PR_5(cohenPolygonClipping)\bin\Debug\PR_5(cohenPolygonClipping).exe"

```
 Enter No of edges of polygon  4

 Enter point 0 x space y 100 250

 Enter point 1 x space y 400 400

 Enter point 2 x space y 600 250

 Enter point 3 x space y 400 50

 Test 2k = 5
200 300
400 400
600 250
400 50
200 183
```



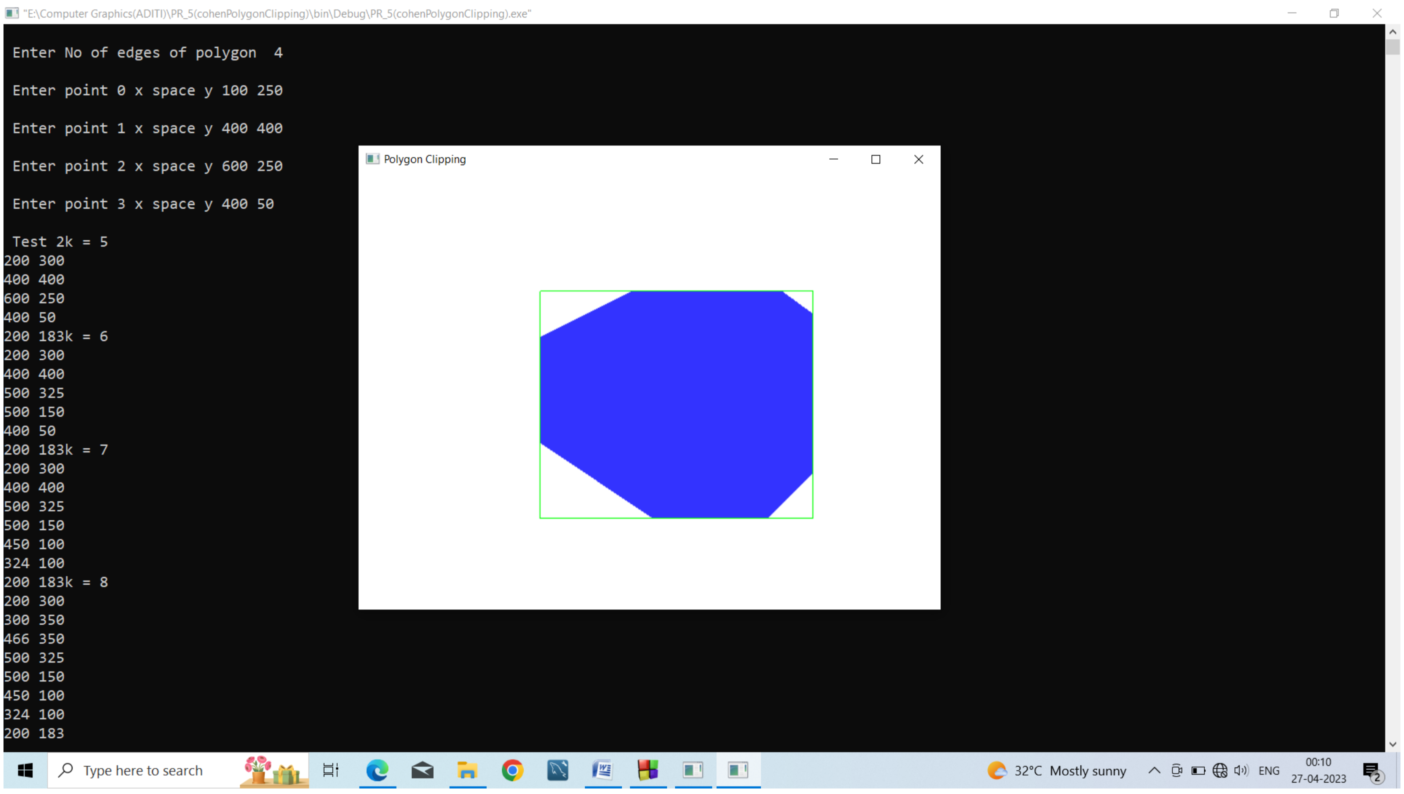
"E:\Computer Graphics(ADITI)\PR_5(cohenPolygonClipping)\bin\Debug\PR_5(cohenPolygonClipping).exe"

```
 Enter No of edges of polygon  4

 Enter point 0 x space y 100 250

 Enter point 1 x space y 400 400

 Enter point 2 x space y 600 250

 Enter point 3 x space y 400 50

 Test 2k = 5
200 300
400 400
600 250
400 50
200 183k = 6
200 300
400 400
500 325
500 150
400 50
200 183
```



"E:\Computer Graphics(ADITI)\PR_5(cohenPolygonClipping)\bin\Debug\PR_5(cohenPolygonClipping).exe"

```
 Enter No of edges of polygon  4

 Enter point 0 x space y 100 250

 Enter point 1 x space y 400 400

 Enter point 2 x space y 600 250

 Enter point 3 x space y 400 50

 Test 2k = 5
200 300
400 400
600 250
400 50
200 183k = 6
200 300
400 400
500 325
500 150
400 50
200 183k = 7
200 300
400 400
500 325
500 150
450 100
324 100
200 183
```



"E:\Computer Graphics(ADITI)\PR_5(cohenPolygonClipping)\bin\Debug\PR_5(cohenPolygonClipping).exe"

```
 Enter No of edges of polygon  4

 Enter point 0 x space y 100 250

 Enter point 1 x space y 400 400

 Enter point 2 x space y 600 250

 Enter point 3 x space y 400 50

 Test 2k = 5
200 300
400 400
600 250
400 50
200 183k = 6
200 300
400 400
500 325
500 150
400 50
200 183k = 7
200 300
400 400
500 325
500 150
450 100
324 100
200 183k = 8
200 300
300 350
466 350
500 325
500 150
450 100
324 100
200 183
```