Practical No:2

1)Implement DDA and Bresenham line drawing algorithm to draw: i) Simple Line ii) Dotted Line iii) Dashed Line iv) Solid line; using mouse interface Divide the screen in four quadrants with center as (0, 0). The line should work for all the slopes positive as well as negative.

Code:

```
#include<iostream>
#include<GL/glut.h>
using namespace std;
int Algo,type;
void Init()
{
  glClearColor(0,0,0,0);
  glColor3f(0,1,0);
  gluOrtho2D(0,640,0,480);
  glClear(GL_COLOR_BUFFER_BIT);
}
int sign(float a){
 if(a==0){
     return 0;
}
if(a>0){
 return 1;
}
return -1;
```

```
}
void B_Line(int x_1,int y_1,int x_2,int y_2,int t){
    float dy, dx, m , P;
    dy = y_2 - y_1;
    dx = x_2 - x_1;
    m = dy/dx;
    P = 2*dy - dx;
    int x = x_1, y = y_1;
    cout<<"\n x1 = "<<x<<" y1 = "<<y;
    if(m<1){
        int cnt=1;
        for(int i=0; i<=dx;i++){
            if(t == 1){
                glBegin(GL_POINTS);
                    glVertex2i(x,y);
                glEnd();
            }
            if(t == 2){
                if(i%2==0){
                    glBegin(GL_POINTS);
                        glVertex2i(x,y);
                    glEnd();
                }
            }
            if(t == 3){
                if(cnt <= 10){
```

```
          glBegin(GL_POINTS);
             glVertex2i(x,y);
          glEnd();
       }
       cnt++;
       if(cnt == 15){
          cnt =1;
       }
    }
    if(P<0){
       x = x +1;
       y =y;
       P = P + 2*dy;
    }
    else{
       x= x+1;
       y = y+1;
       P = P + 2*dy - 2*dx;
    }
 }
}
else{
 int cnt = 1;
 for(int i=0;i<=dy;i++){
    if(t == 1){
       glBegin(GL_POINTS);
```

```
        glVertex2i(x,y);
    glEnd();
}
if(t == 2){
    if(i%2==0){
        glBegin(GL_POINTS);
            glVertex2i(x,y);
        glEnd();
    }
}
if(t == 3){
    if(cnt <= 10){
        glBegin(GL_POINTS);
            glVertex2i(x,y);
        glEnd();
    }
    cnt++;
    if(cnt == 15){
        cnt =1;
    }
}
if(P<0){
    x = x;
    y =y+1;
    P = P + 2*dx;
}
```

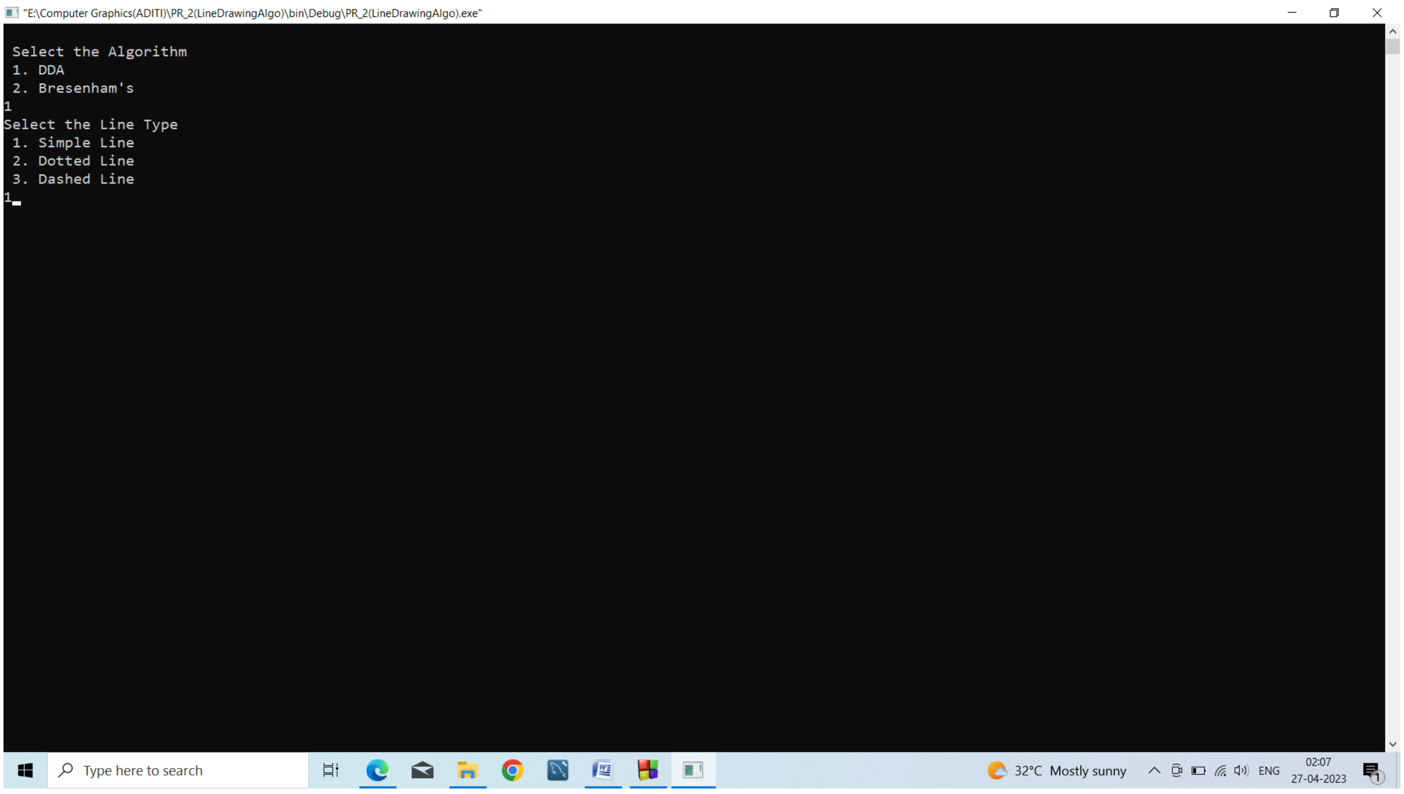
```
         else{


            x= x+1;

            y = y+1;

            P = P + 2*dx - 2*dy;

         }

      }

   }

   cout<<"\n xlast = "<<x<<" ylast = "<<y;

   glFlush();

}

void DDA_LINE(int x_1,int y_1,int x_2,int y_2, int t){

   float dx,dy,length;

   dx = x_2-x_1;

   dy = y_2-y_1;

   if(abs(dx) >= abs(dy)){

      length = abs(dx);

   }

   else{

      length = abs(dy);

   }

   float xin, yin;

   xin = dx/length;

   yin = dy/length;

   float x,y;

   x = x_1 + 0.5 * sign(xin);
```

```
y = y_1 + 0.5 * sign(yin);

int i=0;

int cnt =1;

while(i<=length){

   if(t == 1){

      glBegin(GL_POINTS);

         glVertex2i(x,y);

      glEnd();

   }

   if(t == 2){

      if(i%2==0){

         glBegin(GL_POINTS);

            glVertex2i(x,y);

         glEnd();

      }

   }

   if(t == 3){

      if(cnt <= 10){

         glBegin(GL_POINTS);

            glVertex2i(x,y);

         glEnd();

      }

      cnt++;

      if(cnt == 15){

         cnt =1;

      }
```

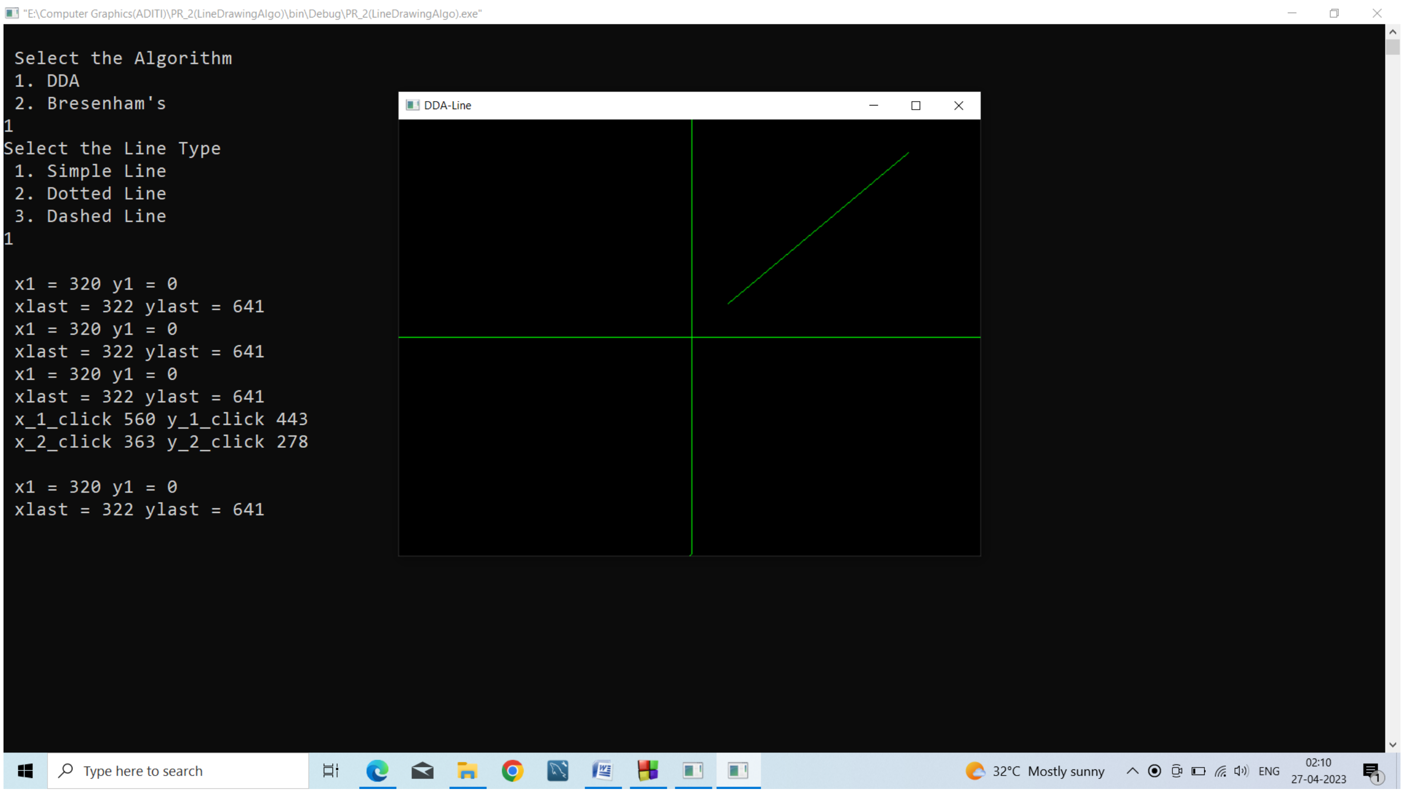
```
        }
        x = x + xin;
        y = y + yin;
        i++ ;
    }
    glFlush();
}
void display()
{
    DDA_LINE(0,240,640,240,1);
    B_Line(320,0,320,640,1);
    glFlush();
}
void mymouse(int b,int s, int x, int y)
{
    static int x_s,y_s,x_e,y_e,pt=0;
    if(b==GLUT_LEFT_BUTTON && s==GLUT_DOWN)
    {
        if(pt==0)
        {
            x_s =x;
            y_s =480 - y;
            pt++;
            glBegin(GL_POINTS);
                glVertex2i(x_s,y_s);
            glEnd();
```

```
      }
      else
      {
         x_e=x;
         y_e=480-y;
         cout<<"\n x_1_click "<<x_s<<" y_1_click "<<y_s;
         cout<<"\n x_2_click "<<x_e<<" y_2_click "<<y_e<<"\n";
         glBegin(GL_POINTS);
            glVertex2i(x_e,y_e);
         glEnd();
         if(Algo == 1){
            DDA_LINE(x_s,y_s,x_e,y_e,type);
         }
         if(Algo == 2){
            B_Line(x_s,y_s,x_e,y_e,type);
         }
      }
   }
   else if(b==GLUT_RIGHT_BUTTON && s==GLUT_DOWN)
      {
         pt=0;
      }
   glFlush();
}
int main(int argc ,char **argv)
{
   cout<<"\n Select the Algorithm \n 1. DDA \n 2. Bresenham's \n";
   cin>>Algo;
   cout<<"Select the Line Type \n 1. Simple Line \n 2. Dotted Line\n 3. Dashed Line
\n";
   cin>>type;
   if((Algo == 1 || Algo == 2 )&&(type==1 || type==2 || type==3)){
   }
   else{
      cout<<"\n Option enter are wrong \n";
      return 0;
   }
   glutInit(&argc,argv);
   glutInitDisplayMode(GLUT_SINGLE|GLUT_RGB);
   glutInitWindowPosition(100,100);
   glutInitWindowSize(640,480);
   glutCreateWindow("DDA-Line");
   Init();
   glutDisplayFunc(display);
   glutMouseFunc(mymouse);
   glutMainLoop();
   return 0;
}
```

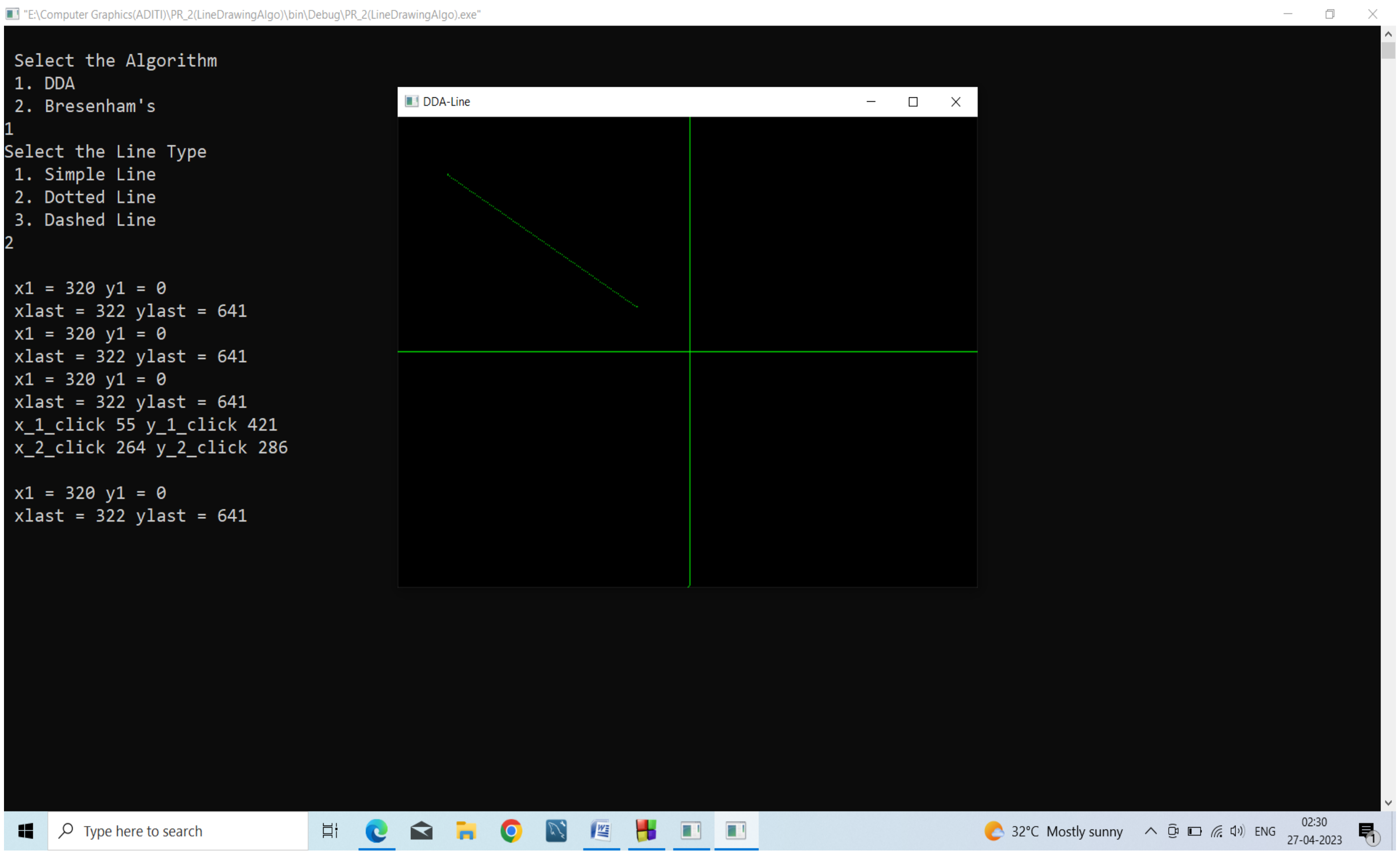
Output:


"E:\Computer Graphics(ADITI)\PR_2(LineDrawingAlgo)\bin\Debug\PR_2(LineDrawingAlgo).exe"

```
 Select the Algorithm
 1. DDA
 2. Bresenham's
1
Select the Line Type
 1. Simple Line
 2. Dotted Line
 3. Dashed Line
1
```

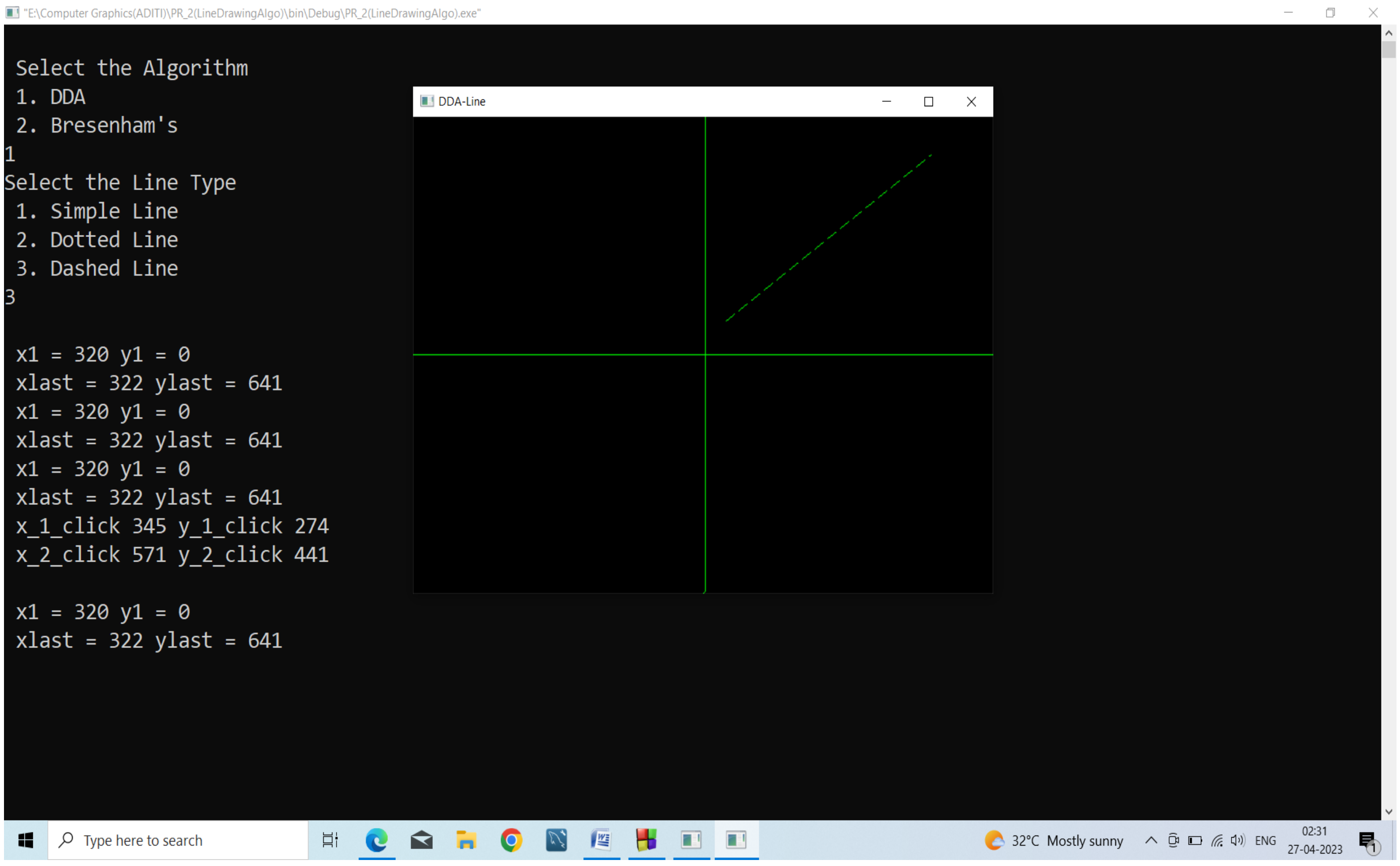

"E:\Computer Graphics(ADITI)\PR_2(LineDrawingAlgo)\bin\Debug\PR_2(LineDrawingAlgo).exe"
DDA-Line

```
 Select the Algorithm
 1. DDA
 2. Bresenham's
1
Select the Line Type
 1. Simple Line
 2. Dotted Line
 3. Dashed Line
1

 x1 = 320 y1 = 0
 xlast = 322 ylast = 641
 x1 = 320 y1 = 0
 xlast = 322 ylast = 641
 x1 = 320 y1 = 0
 xlast = 322 ylast = 641
 x_1_click 560 y_1_click 443
 x_2_click 363 y_2_click 278

 x1 = 320 y1 = 0
 xlast = 322 ylast = 641
```



"E:\Computer Graphics(ADITI)\PR_2(LineDrawingAlgo)\bin\Debug\PR_2(LineDrawingAlgo).exe"

```
 Select the Algorithm
 1. DDA
 2. Bresenham's
1
Select the Line Type
 1. Simple Line
 2. Dotted Line
 3. Dashed Line
2

 x1 = 320 y1 = 0
 xlast = 322 ylast = 641
 x1 = 320 y1 = 0
 xlast = 322 ylast = 641
 x1 = 320 y1 = 0
 xlast = 322 ylast = 641
 x_1_click 55 y_1_click 421
 x_2_click 264 y_2_click 286

 x1 = 320 y1 = 0
 xlast = 322 ylast = 641
```



"E:\Computer Graphics(ADITI)\PR_2(LineDrawingAlgo)\bin\Debug\PR_2(LineDrawingAlgo).exe"

```
 Select the Algorithm
 1. DDA
 2. Bresenham's
1
Select the Line Type
 1. Simple Line
 2. Dotted Line
 3. Dashed Line
3

 x1 = 320 y1 = 0
 xlast = 322 ylast = 641
 x1 = 320 y1 = 0
 xlast = 322 ylast = 641
 x1 = 320 y1 = 0
 xlast = 322 ylast = 641
 x_1_click 345 y_1_click 274
 x_2_click 571 y_2_click 441

 x1 = 320 y1 = 0
 xlast = 322 ylast = 641
```