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program7

Write a program to implement the Liang-Barsky line clipping algorithm. Make provision to specify the input for multiple lines, windows for clipping and viewport for displaying the clipped Image.

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

double xmin, ymin, xmax, ymax;
double xvmin, yvmin, xvmax, yvmax;
int n;

struct line_segment{
        int x1, y1, x2, y2;
};
struct line_segment ls[10];

int cliptest(double p, double q, double* u1, double* u2)
{
        double r;
        if(p) r=q/p;

        if(p<0.0)
        {
                if(r>*u1) *u1=r;
                if(r>*u2) return(false);
        }
```

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```
else
    if (p > 0.0)
    {
        if (r < *u2) *u1 = r;
        if (r < *u1) return (false);
    }
    else if (p == 0.0)
    {
        if (q < 0.0) return (false);
    }

return (true);
}
void LiangBarskyLineClipAndDraw (double x0, double y0, double
                                 x1, double y1)
{
    double dx = x1 - x0, dy = y1 - y0, u1 = 0.0, u2 = 1.0;
    glColor3f (1.0, 0.0, 0.0);
    glBegin (GL_LINE_LOOP);
    glVertex2f (xvmin, yvmin);
    glVertex2f (xvmx, yvmax);
    glVertex2f (xvmin, yvmax);
    glEnd();
    if (ClipTest (-dx, x0 - xmin, &u1, &u2))
        if (ClipTest (dx, xmax - x0, &u1, &u2))
            if (ClipTest (-dy, y0 - ymin, &u1, &u2))
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```
if (clipset(dy, ymax-y0, -u1, -u2))
    {
        if (u2 < 1.0)
          {
            x1 = x0 + u2 * dx;
            y1 = y0 + u2 * dy;
          }
        if (u1 > 0.0)
          {
            x0 = x0 + u1 * dx;
            y0 = y0 + u1 * dy;
          }
        double sx = (xvmax - xvmin) / (xmax - xmin);
        double sy = (yvmax - yvmin) / (ymax - ymin);
        double vx0 = xmin + (x0 - xmin) * sx;
        double vy0 = yvmin + (y0 - ymin) * sy;
        double vx1 = xvmin + (x1 - xmin) * sx;
        double vy1 = yvmin + (y1 - ymin) * sy;

        glColor3f(0.0, 0.0, 1.0);
        glBegin(GL_LINES);
        glVertex2d(vx0, vy0);
        glVertex2d(vx1, vy1);
        glEnd();
    }
}
```

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```
void display()
{
    glClear(GL_COLOR_BUFFER_BIT);
    glColor3f(1.0, 0.0, 0.0);
    for(int i=0; i<n; i++)
    {
        glBegin(GL_LINES);
        glVertex2d(ls[i].x1, ls[i].y1);
        glVertex2d(ls[i].x2, ls[i].y2);
        glEnd();
    }
    glColor3f(0.0, 0.0, 1.0);
    glBegin(GL_LINE_LOOP);
    glVertex2f(xmin, ymin);
    glVertex2f(xmax, ymin);
    glVertex2f(xmax, ymax);
    glVertex2f(xmin, ymax);
    glEnd();
    for(int i=0; i<n; i++)
        LiangBarskyLineClipAndDraw(ls[i].x1, ls[i].y1,
                                   ls[i].x2, ls[i].y2);
    glFlush();
}
```

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```
void myinit()
{
    glClearColor(1.0,1.0,1.0,1.0);
    glColor3f(1.0,0.0,0.0);
    glLineWidth(2.0);
    glMatrixMode(GL_PROJECTION);
    glLoadIdentity();
    gluOrtho2D(0.0,499.0,0.0,499.0);
}

int main(int argc,char** argv)
{
    glutInit(&argc,argv);
    glutInitDisplayMode(GLUT_SINGLE|GLUT_RGB);
    glutInitWindowSize(500,500);
    glutInitWindowPosition(0,0);

    printf("Enter window coordinates:(xmin,ymin,xmax,
                ymax)\n");
    scanf_s("%lf%lf%lf%lf",&xmin,&ymin,&xmax,&
                ymax);
    printf("Enter no. of lines:\n");
    scanf_s("%d",&n);

    for(int i=0;i<n;i++)
    {
        printf("Enter coordinates:(x1,y1,x2,y2)\n");
        scanf_s("%d%d%d%d",&ls[i].x1,&ls[i].y1,&ls[i].x2,
                &ls[i].y2);
    }
```

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```
    glutCreateWindow ("Liang Barsky Line Clipping Algorithm");
    glutDisplayFunc (display);
    myinit();
    glutMainLoop();
}
```

OUTPUT:

```
Enter window coordinates: (xmin ymin xmax ymax)
100 100 400 400
Enter viewport coordinates: (xvmin yvmin xvmax yvmax)
200 200 350 350
Enter no. of lines:
4
Enter coordinates: (x1 y1 x2 y2)
200 50 350 50
Enter coordinates: (x1 y1 x2 y2)
50 70 350 330
Enter coordinates: (x1 y1 x2 y2)
50 150 250 150
Enter coordinates: (x1 y1 x2 y2)
125 50 125 450
```

Liang Barsky Line Clipping Algorithm