Barrackpore Rastraguru Surendranath College

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Semester- VI

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WRITE A PROGRAM IN C LANGUAGE TO :

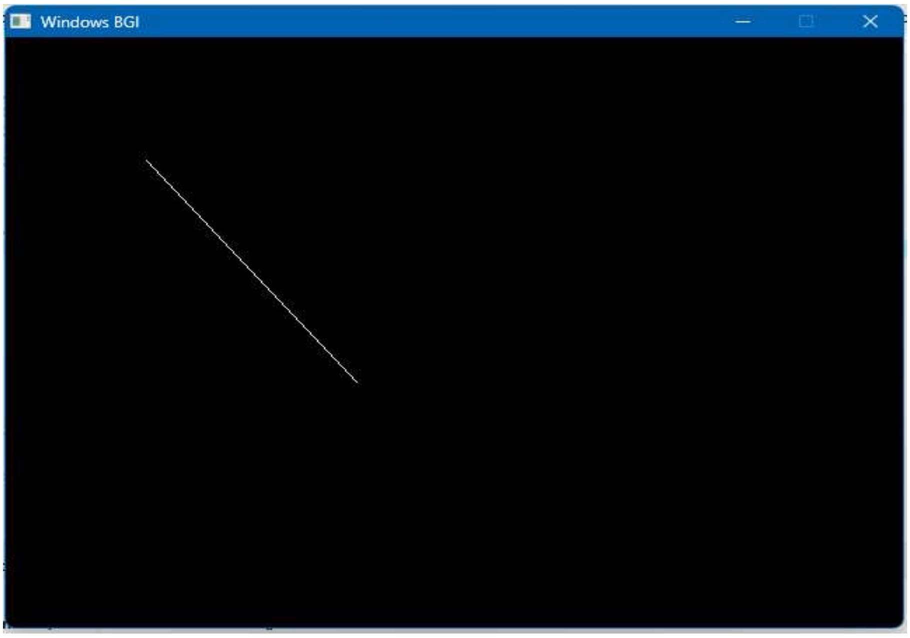
PROGRAM NUMBER: 1

Implement DAA line drawing algorithm with end points (100,100), (250, 280).

Program code:

```c
// C program for DDA line generation
#include <graphics.h>
#include <math.h>
#include <stdio.h>
#include <cstdlib> // for using abs function

// DDA Function for line generation
void DDA(int X0, int Y0, int X1, int Y1)
{
    // calculate dx &dy
    int dx = X1 - X0;
    int dy = Y1 - Y0;

    // calculate steps required for generating pixels
    int steps = abs(dx) > abs(dy) ? abs(dx) : abs(dy);

    // calculate increment in x & y for each steps
    float Xinc = dx / (float)steps;
    float Yinc = dy / (float)steps;

    // Put pixel for each step
    float X = X0;
    float Y = Y0;
    for (int i = 0; i<= steps; i++) {
        putpixel(round(X), round(Y),
                WHITE); // put pixel at (X,Y)
        X += Xinc; // increment in x at each step
        Y += Yinc; // increment in y at each step
        delay(100); // for visualization of line-
                    // generation step by step
    }
}
int main()
{
    int gd = DETECT, gm;
    // Initialize graphics function
    initgraph(&gd, &gm, "");
    int X0 = 2, Y0 = 2, X1 = 14, Y1 = 16;
    // Function call
    DDA(100, 100, 250, 280);
    getch();
    closegraph();
    return 0;
}
```

Program output:



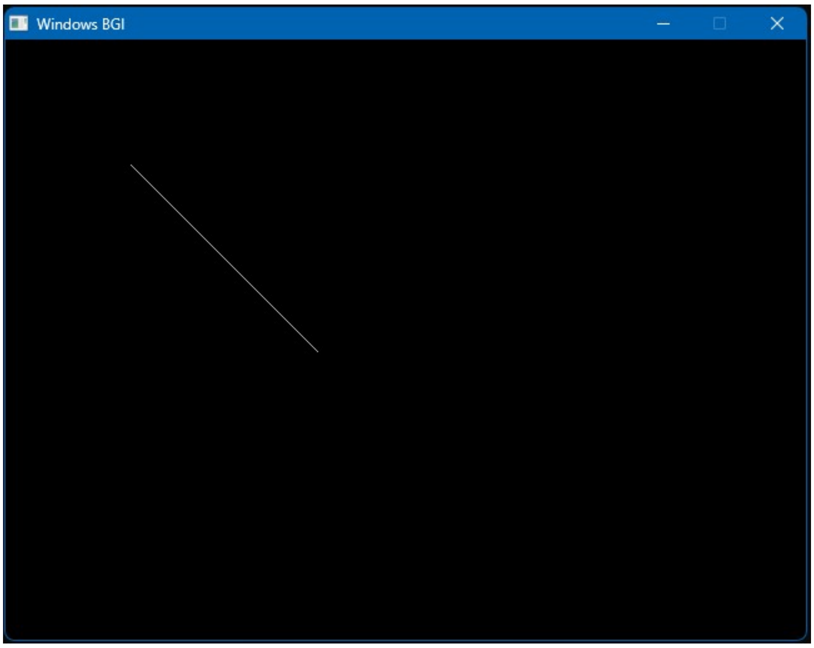
PROGRAM NUMBER: 2

Implemeent Bresenham line drawing algorithm with end points (100,100), (250, 280).

Program code:

```
/*program to draw line using Bresenham line drawing algorithm*/
#include <stdio.h>
#include <graphics.h>
void drawline(int x0, int y0, int x1, int y1)
{
    int dx, dy, p, x, y;
    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;
            delay(100);
        }
        else
        {
            putpixel(x, y, 7);
            p = p + 2 * dy;
        }
        x = x + 1;
        delay(100);
    }
}
int main()
{
    int gdriver = DETECT, gmode, error, x0, y0, x1, y1;
    initgraph(&gdriver, &gmode, "");
    drawline(100, 100, 250, 280);
    getch();
    closegraph();
    return 0;
}
```

Program output:



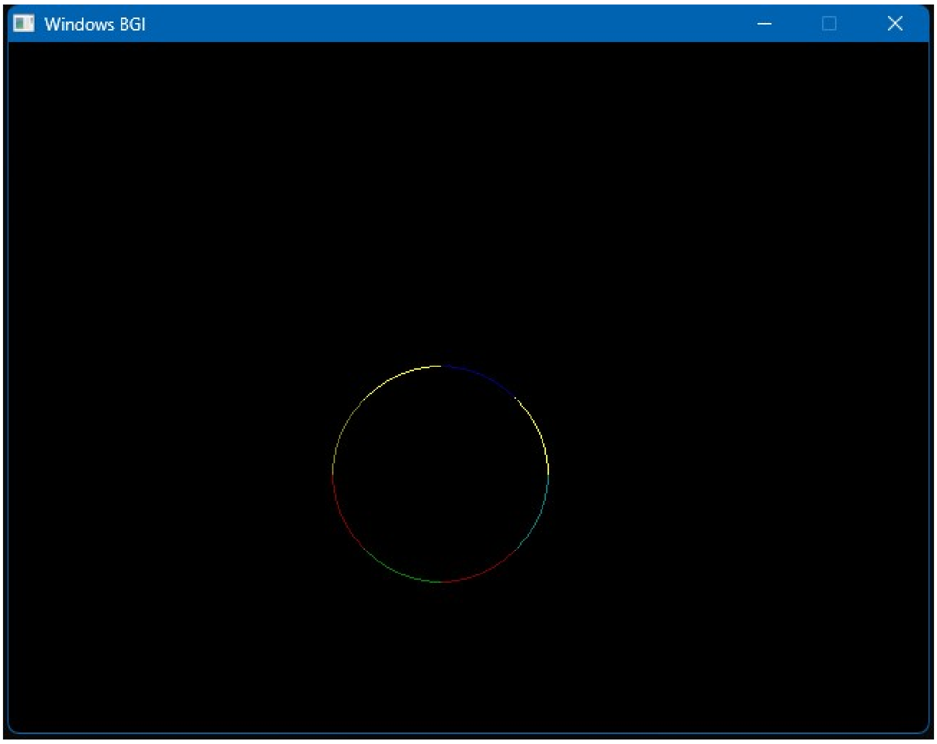
PROGRAM NUMBER: 3

Write a Program in C language to implement the Bresenham circle drawing algorithm. Test your program to draw the circles, center (300,300), radius 75 units.

Program code:

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

void drawCircle(int xc, int yc, int x, int y)
{
    putpixel(xc + x, yc + y, RED);
    putpixel(xc - x, yc + y, GREEN);
    putpixel(xc + x, yc - y, BLUE);
    putpixel(xc - x, yc - y, YELLOW);
    putpixel(xc + y, yc + x, CYAN);
    putpixel(xc - y, yc + x, RED);
    putpixel(xc + y, yc - x, YELLOW);
    putpixel(xc - y, yc - x, BROWN);
}
void circleBres(int xc, int yc, int r)
{
    int x = 0, y = r;
    int d = 3 - 2 * r;
    drawCircle(xc, yc, x, y);
    while (y >= x)
    {
        x++;

        if (d > 0)
        {
            y--;
            d = d + 4 * (x - y) + 10;
        }
        else
            d = d + 4 * x + 6;
        drawCircle(xc, yc, x, y);
        delay(50);
    }
}
int main()
{
    int xc = 300, yc = 300, r = 75;
    int gd = DETECT, gm;
    initgraph(&gd, &gm, ""); // initialize graph
    circleBres(xc, yc, r);   // function call
    getch();
    closegraph();
    return 0;
}
```

Program output:



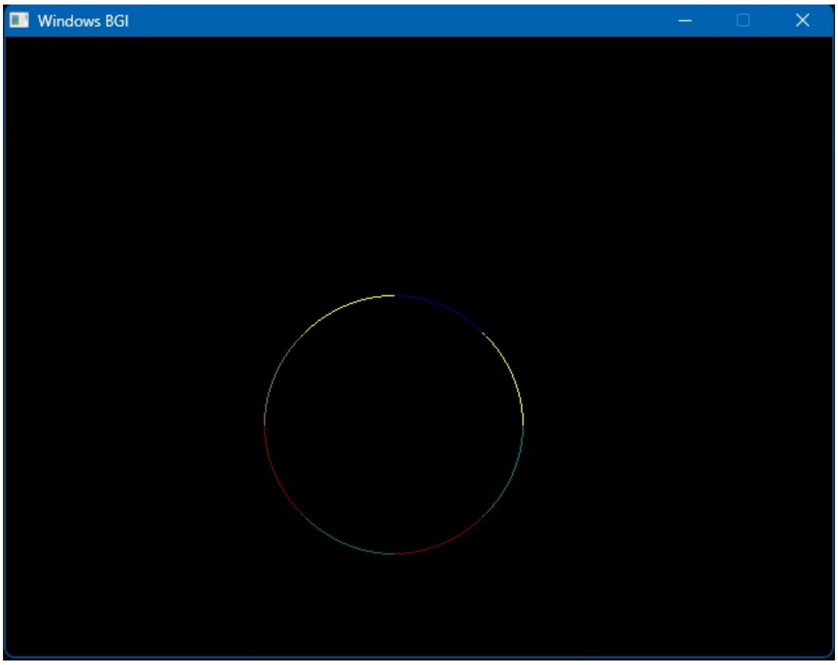
PROGRAM NUMBER: 4

Write a Program in C language to implement the Bresenham circle drawing algorithm. Test your program to draw the circles, center (300,300), radius 100 units.

Program code:

```
/*C-program for circle drawing using Bresenham's Algorithm in computer-
graphics*/

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

void drawCircle(int xc, int yc, int x, int y)
{
    putpixel(xc + x, yc + y, RED);
    putpixel(xc - x, yc + y, GREEN);
    putpixel(xc + x, yc - y, BLUE);
    putpixel(xc - x, yc - y, YELLOW);
    putpixel(xc + y, yc + x, CYAN);
    putpixel(xc - y, yc + x, RED);
    putpixel(xc + y, yc - x, YELLOW);
    putpixel(xc - y, yc - x, BROWN);
}
void circleBres(int xc, int yc, int r)
{    int x = 0, y = r;
    int d = 3 - 2 * r;
    drawCircle(xc, yc, x, y);
    while (y >= x)
    {
        x++;
        if (d > 0)        {            y--;
            d = d + 4 * (x - y) + 10;        }
        else
            d = d + 4 * x + 6;
        drawCircle(xc, yc, x, y);
        delay(50);
    }
}
int main(){
    int xc = 300, yc = 300, r = 100;
    int gd = DETECT, gm;
    initgraph(&gd, &gm, ""); // initialize graph
    circleBres(xc, yc, r);   // function call
    getch();
    closegraph();
    return 0;
}
```

Program output:



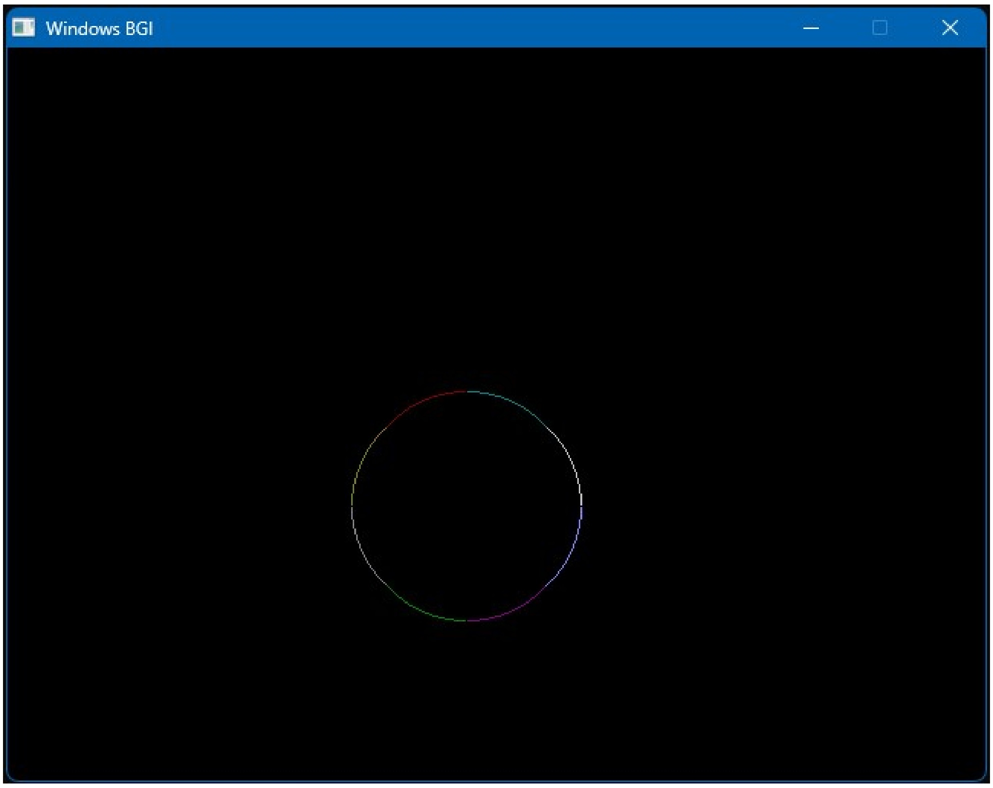
PROGRAM NUMBER: 5

Write a Program in C language to implement the Midpoint circle drawing algorithm. Test your program to draw the circles, center (300,300), radius 75 units.

Program code:

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

void midp(int r, int xc, int yc)
{
    int x, y;
    float d;
    d = 1.25 - r;
    x = 0;
    y = r;
    do
    {
        if (d < 0)
        {
            x = x + 1;
            d = d + 2 * x + 1;
        }
        else        {            x = x + 1;
            y = y - 1;
            d = d + 2 * x - 2 * y + 10;
            delay(100);
        }
        putpixel(xc + x, yc + y, 5);
        putpixel(xc - y, yc - x, 6);
        putpixel(xc + y, yc - x, 7);
        putpixel(xc - y, yc + x, 8);
        putpixel(xc + y, yc + x, 9);
        putpixel(xc - x, yc - y, 4);
        putpixel(xc + x, yc - y, 3);
        putpixel(xc - x, yc + y, 2);
    } while (x < y);
}

int main()
{
    int gd = DETECT, gm;
    int xc, yc, r;
    xc = 300;
    yc = 300;
    r = 75;
    initgraph(&gd, &gm, "");
    midp(r, xc, yc);
    delay(1500);
    getch();
    closegraph();
    return 0;
}
```

Program output:



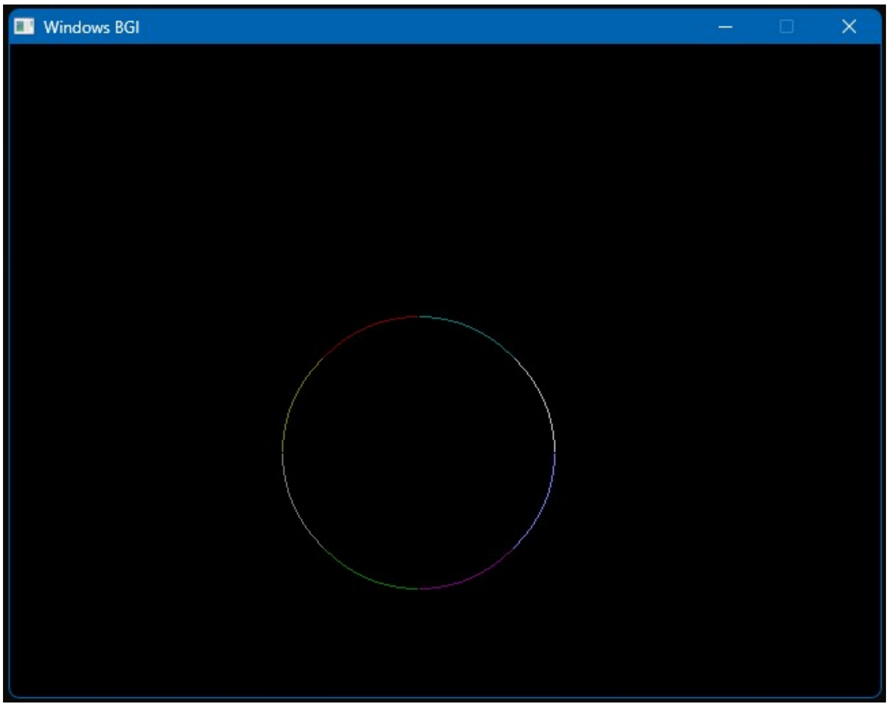
PROGRAM NUMBER: 6

Write a Program in C language to implement the Midpoint circle drawing algorithm. Test your program to draw the circles, center (300,300), radius 100 units.

Program code:

```
#include <stdio.h>
#include <graphics.h>
void midp(int r, int xc, int yc)
{
    int x, y;
    float d;
    d = 1.25 - r;
    x = 0;
    y = r;
    do
    {
        if (d < 0)
        {
            x = x + 1;
            d = d + 2 * x + 1;
        }
        else
        {
            x = x + 1;
            y = y - 1;
            d = d + 2 * x - 2 * y + 10;
            delay(100);
        }
        putpixel(xc + x, yc + y, 5);
        putpixel(xc - y, yc - x, 6);
        putpixel(xc + y, yc - x, 7);
        putpixel(xc - y, yc + x, 8);
        putpixel(xc + y, yc + x, 9);
        putpixel(xc - x, yc - y, 4);
        putpixel(xc + x, yc - y, 3);
        putpixel(xc - x, yc + y, 2);
    } while (x < y);
}
int main()
{
    int gd = DETECT, gm;
    int xc, yc, r;
    xc = 300;
    yc = 300;
    r = 100;
    initgraph(&gd, &gm, "");
    midp(r, xc, yc);
    delay(1500);
    getch();
    closegraph();
    return 0;
}
```

Program output:



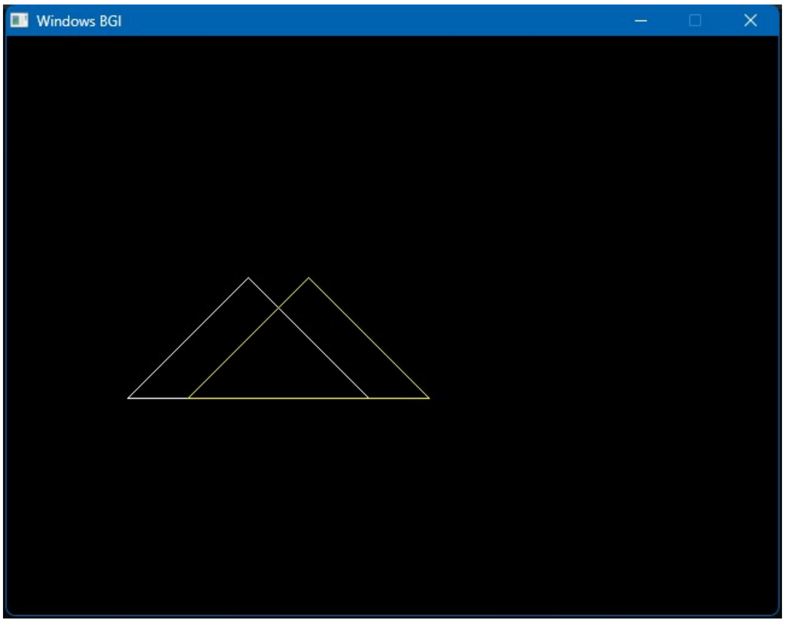
PROGRAM NUMBER: 7

Write a program in C language that will translate a triangle with coordinates (200,200), (100,300), & (300,300) with translation parameters $t_x = 50, t_y = 0$. Show translated

Program code:

```c
#include <conio.h>
#include <graphics.h>
#include <stdio.h>
int main()
{
    int gd = DETECT, gm;
    int x, y, x1, y1, x2, y2, tx, ty;
    x = 200;
    y = 200;
    x1 = 100;
    y1 = 300;
    x2 = 300;
    y2 = 300;
    initgraph(&gd, &gm, "");
    line(x, y, x1, y1);
    line(x1, y1, x2, y2);
    line(x2, y2, x, y);
    tx = 50;
    ty = 0;
    setcolor(RED);
    line(x + tx, y + ty, x1 + tx, y1 + ty);
    line(x1 + tx, y1 + ty, x2 + tx, y2 + ty);
    line(x2 + tx, y2 + ty, x + tx, y + ty);
    getch();
    closegraph();
}
```

Program output:



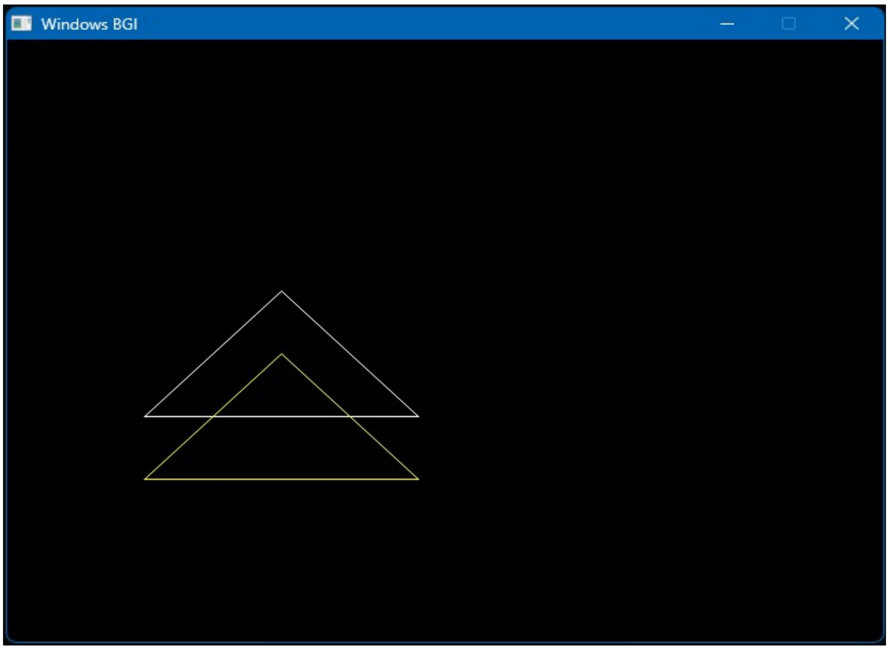
PROGRAM NUMBER: 8

Write a program in C language that will translate a triangle with coordinates (200,200), (100,300), & (300,300) with translation parameters $t_x = 0, t_y = 50$. Show translated triangle.

Program code:

```
#include <conio.h>
#include <graphics.h>
#include <stdio.h>
int main()
{
    int gd = DETECT, gm;
    int x, y, x1, y1, x2, y2, tx, ty;
    x = 200;
    y = 200;
    x1 = 100;
    y1 = 300;
    x2 = 300;
    y2 = 300;
    initgraph(&gd, &gm, "");
    line(x, y, x1, y1);
    line(x1, y1, x2, y2);
    line(x2, y2, x, y);
    tx = 0;
    ty = 50;
    setcolor(RED);
    line(x + tx, y + ty, x1 + tx, y1 + ty);
    line(x1 + tx, y1 + ty, x2 + tx, y2 + ty);
    line(x2 + tx, y2 + ty, x + tx, y + ty);
    getch();
    closegraph();
}
```

Program output:



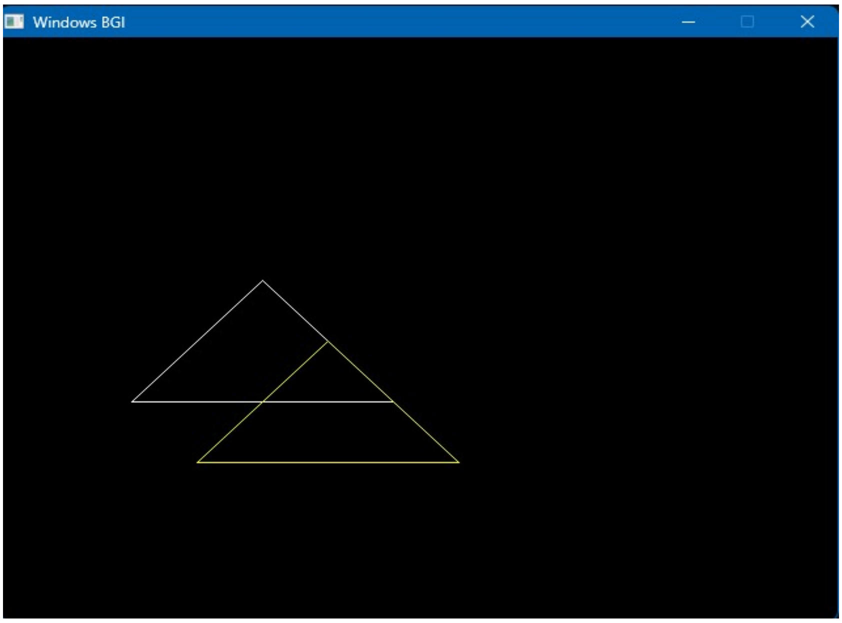
PROGRAM NUMBER: 9

Write a program in C language that will translate a triangle with coordinates (200,200), (100,300), & (300,300) with translation parameters $t_x = 50, t_y = 50$. Show translated triangle.

Program code:

```
#include <conio.h>
#include <graphics.h>
#include <stdio.h>
int main(){
    int gd = DETECT, gm;
    int x, y, x1, y1, x2, y2, tx, ty;
    x = 200;
    y = 200;
    x1 = 100;
    y1 = 300;
    x2 = 300;
    y2 = 300;
    initgraph(&gd, &gm, "");
    line(x, y, x1, y1);
    line(x1, y1, x2, y2);
    line(x2, y2, x, y);
    tx = 50;
    ty = 50;
    setcolor(RED);
    line(x + tx, y + ty, x1 + tx, y1 + ty);
    line(x1 + tx, y1 + ty, x2 + tx, y2 + ty);
    line(x2 + tx, y2 + ty, x + tx, y + ty);
    getch();
    closegraph();}
```

Program output:



PROGRAM NUMBER: 10

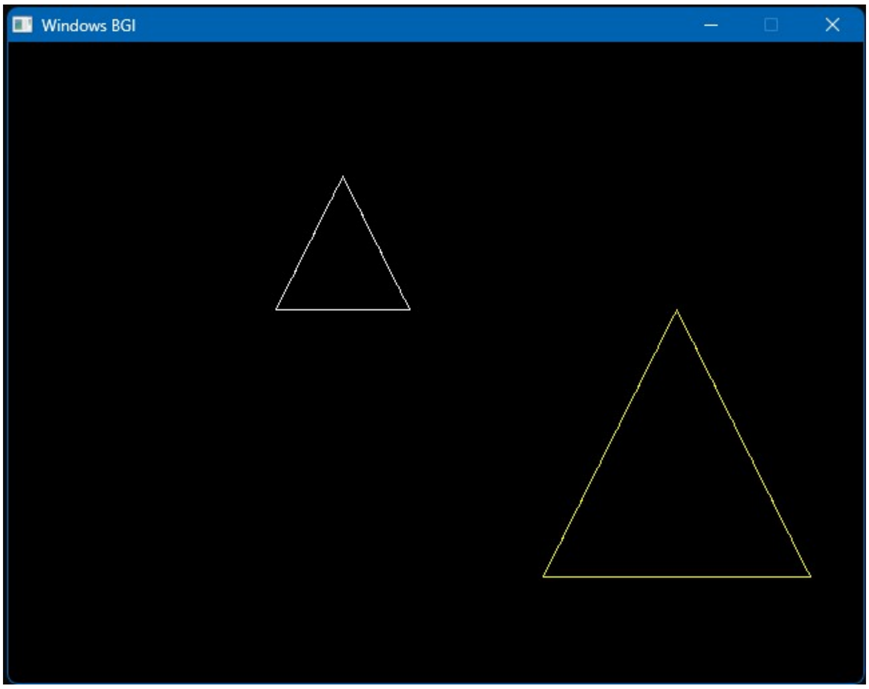
Write a program in C language that will scale a triangle with coordinates (200,200), (100,300), & (300,300) with scaling parameters $S_x = S_y = 2,$

Scale with respect to Origin

Program code:

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

void scaleTriangle(int x1, int y1, int x2, int y2, int x3, int y3, float
sx, float sy)
{
    int newX1, newY1, newX2, newY2, newX3, newY3;

    newX1 = x1 * sx;
    newY1 = y1 * sy;
    newX2 = x2 * sx;
    newY2 = y2 * sy;
    newX3 = x3 * sx;
    newY3 = y3 * sy;

    line(newX1, newY1, newX2, newY2);
    line(newX2, newY2, newX3, newY3);
    line(newX3, newY3, newX1, newY1);
}
int main()
{
    int gd, gm;
    gd = DETECT;
    initgraph(&gd, &gm, NULL);

    // Original triangle coordinates
    //    int x1 = 250, y1 = 100;
    //    int x2 = 300, y2 = 200;
    //    int x3 = 200, y3 = 200;
    int x1 = 200, y1 = 200;
    int x2 = 100, y2 = 300;
    int x3 = 300, y3 = 300;

    float sx = 2, sy = 2;

    // Draw the original triangle
    line(x1, y1, x2, y2);
    line(x2, y2, x3, y3);
    line(x3, y3, x1, y1);
    setcolor(YELLOW);
    // Scale the triangle
    scaleTriangle(x1, y1, x2, y2, x3, y3, sx, sy);
    getch();
    closegraph();
    return 0;
}
```

Program output:



PROGRAM NUMBER: 11

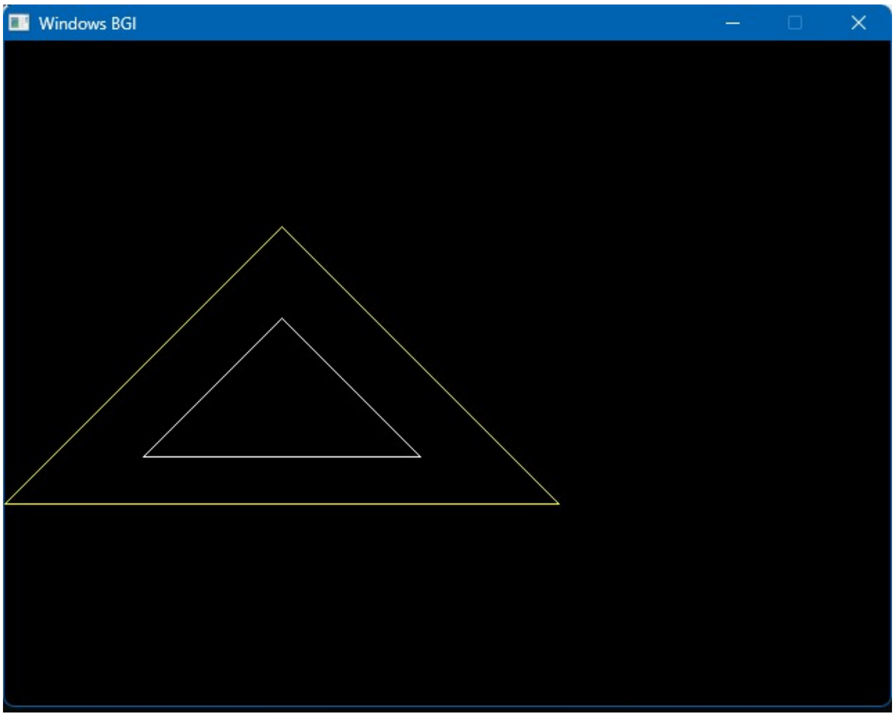
Write a program in C language that will scale a triangle with coordinates (200,200), (100,300), & (300,300) with scaling parameters $S_x = S_y = 2$

Scale with respect to Centroid.

Program code:

```
#include <graphics.h>
void scaleTriangle(int x1, int y1, int x2, int y2, int x3, int y3, float
sx, float sy)
{
    int cx = (x1 + x2 + x3) / 3;
    int cy = (y1 + y2 + y3) / 3;
    // Calculate the scaled coordinates with respect to the centroid
    int nx1 = cx + (x1 - cx) * sx;
    int ny1 = cy + (y1 - cy) * sy;
    int nx2 = cx + (x2 - cx) * sx;
    int ny2 = cy + (y2 - cy) * sy;
    int nx3 = cx + (x3 - cx) * sx;
    int ny3 = cy + (y3 - cy) * sy;
    // Draw the scaled triangle
    line(nx1, ny1, nx2, ny2);
    line(nx2, ny2, nx3, ny3);
    line(nx3, ny3, nx1, ny1);
}
int main()
{
    int gd = DETECT, gm;
    initgraph(&gd, &gm, "");

    // Original triangle coordinates
    int x1 = 200, y1 = 200;
    int x2 = 100, y2 = 300;
    int x3 = 300, y3 = 300;

    // Scaling parameters
    float sx = 2;
    float sy = 2;

    // Draw the original triangle
    line(x1, y1, x2, y2);
    line(x2, y2, x3, y3);
    line(x3, y3, x1, y1);
    setcolor(YELLOW);
    // Scale the triangle and draw the scaled triangle
    scaleTriangle(x1, y1, x2, y2, x3, y3, sx, sy);
    getch();
    closegraph();
    return 0;
}
```

Program output:



PROGRAM NUMBER: 12

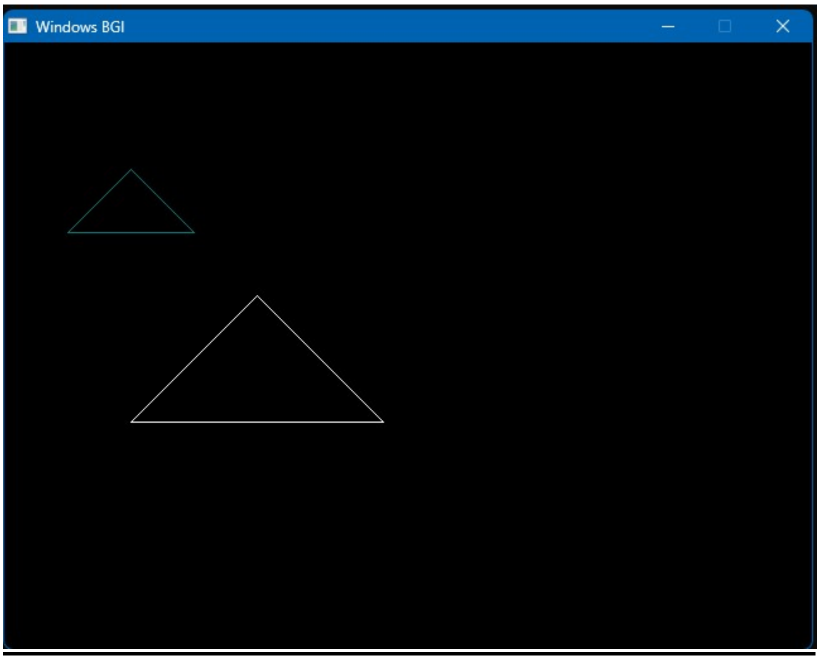
Write a program in C language that will scale a triangle with coordinates (200,200), (100,300), & (300,300) with scaling parameters $S_x = S_y = \frac{1}{2}$.

Scale with respect to Origin

Program code:

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

void scaleTriangle(int x1, int y1, int x2, int y2, int x3, int y3, float
sx, float sy)
{
    int newX1, newY1, newX2, newY2, newX3, newY3;
    newX1 = x1 * sx;
    newY1 = y1 * sy;
    newX2 = x2 * sx;
    newY2 = y2 * sy;
    newX3 = x3 * sx;
    newY3 = y3 * sy;
    line(newX1, newY1, newX2, newY2);
    line(newX2, newY2, newX3, newY3);
    line(newX3, newY3, newX1, newY1);
}
int main()
{
    int gd, gm;
    gd = DETECT;
    initgraph(&gd, &gm, NULL);

    // Original triangle coordinates
    int x1 = 200, y1 = 200;
    int x2 = 100, y2 = 300;
    int x3 = 300, y3 = 300;

    // Scaling factors
    float sx = 0.5, sy = 0.5;

    // Draw the original triangle
    line(x1, y1, x2, y2);
    line(x2, y2, x3, y3);
    line(x3, y3, x1, y1);
    setcolor(CYAN);
    // Scale the triangle
    scaleTriangle(x1, y1, x2, y2, x3, y3, sx, sy);
    getch();
    closegraph();
    return 0;
}
```

Program output:



PROGRAM NUMBER: 13

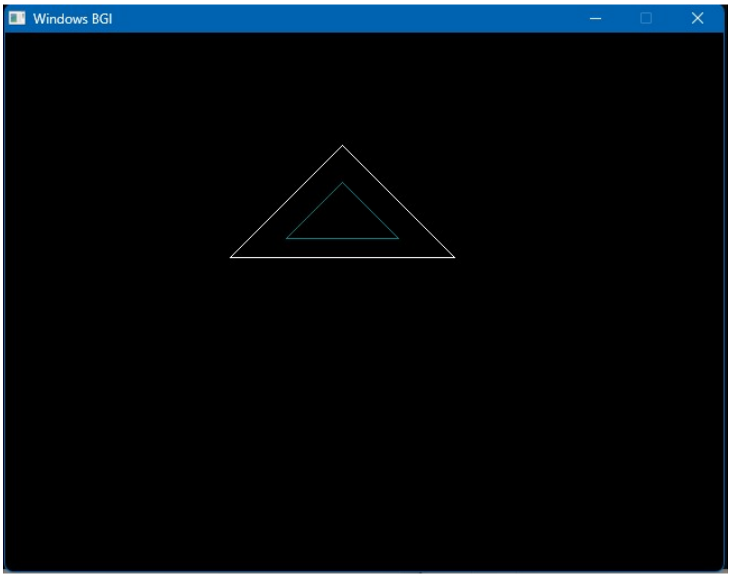
Write a program in C language that will scale a triangle with coordinates (200,200), (100,300), & (300,300) with scaling parameters $S_x = S_y = \frac{1}{2}$.

Scale with respect to Centroid

Program code:

```
#include <graphics.h>
void scaleTriangle(int x1, int y1, int x2, int y2, int x3, int y3, float
sx, float sy)
{
    int cx = (x1 + x2 + x3) / 3;
    int cy = (y1 + y2 + y3) / 3;
    // Calculate the scaled coordinates with respect to the centroid
    int nx1 = cx + (x1 - cx) * sx;
    int ny1 = cy + (y1 - cy) * sy;
    int nx2 = cx + (x2 - cx) * sx;
    int ny2 = cy + (y2 - cy) * sy;
    int nx3 = cx + (x3 - cx) * sx;
    int ny3 = cy + (y3 - cy) * sy;

    // Draw the scaled triangle
    line(nx1, ny1, nx2, ny2);
    line(nx2, ny2, nx3, ny3);
    line(nx3, ny3, nx1, ny1);
}

int main()
{
    int gd = DETECT, gm;
    initgraph(&gd, &gm, "");
    // Original triangle coordinates
    int x1 = 300, y1 = 100;
    int x2 = 400, y2 = 200;
    int x3 = 200, y3 = 200;

    // Scaling parameters
    float sx = 0.5;
    float sy = 0.5;

    // Draw the original triangle
    line(x1, y1, x2, y2);
    line(x2, y2, x3, y3);
    line(x3, y3, x1, y1);
    setcolor(CYAN);
    // Scale the triangle and draw the scaled triangle
    scaleTriangle(x1, y1, x2, y2, x3, y3, sx, sy);
    getch();
    closegraph();
    return 0;
}
```

Program output:



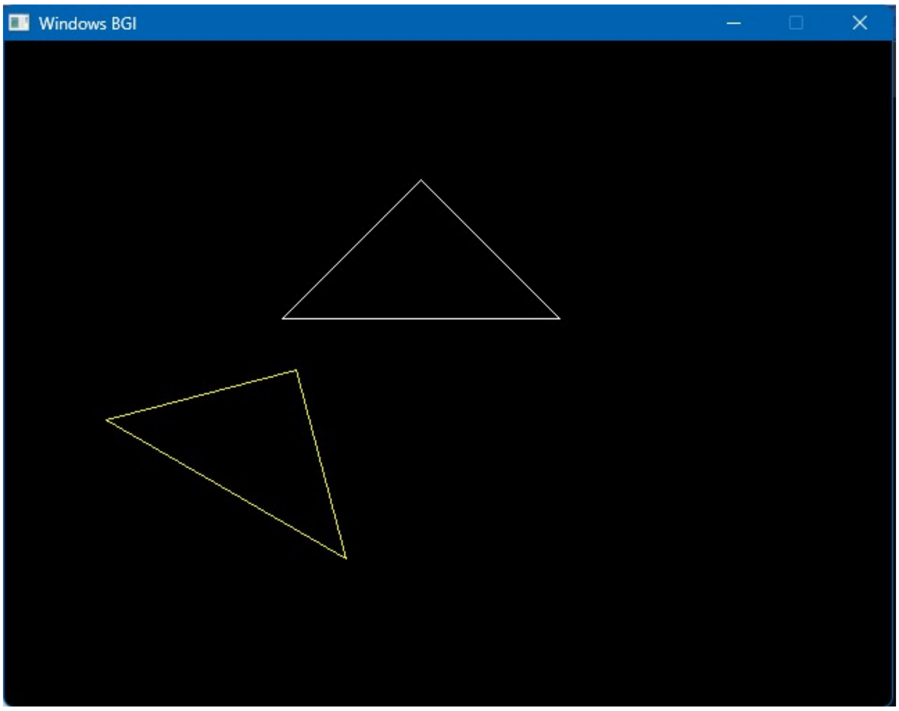
PROGRAM NUMBER: 14

Rotate a triangle with coordinates (200,100), (100,300), (300,300) by 30 degrees with respect to the Origin

Program code:

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

// Function to rotate a point (x, y) by angle theta
void rotatePoint(int *x, int *y, double theta)
{
    double radian = (theta * 3.14159) / 180.0;
    int tempX = *x;
    int tempY = *y;

    *x = round(tempX * cos(radian) - tempY * sin(radian));
    *y = round(tempX * sin(radian) + tempY * cos(radian));
}
// Function to rotate a triangle by angle theta
void rotateTriangle(int x1, int y1, int x2, int y2, int x3, int y3, double
theta)
{
    // Rotate each vertex of the triangle
    rotatePoint(&x1, &y1, theta);
    rotatePoint(&x2, &y2, theta);
    rotatePoint(&x3, &y3, theta);

    // Draw the rotated triangle
    setcolor(YELLOW);
    line(x1, y1, x2, y2);
    line(x2, y2, x3, y3);
    line(x3, y3, x1, y1);
}
int main()
{
    int gd, gm;
    gd = DETECT;
    // Initialize graphics mode
    initgraph(&gd, &gm, NULL);
    // Set color to white
    setcolor(WHITE);
    // Define the coordinates of the triangle
    int x1 = 300, y1 = 100;
    int x2 = 400, y2 = 200;
    int x3 = 200, y3 = 200;
    // Draw the original triangle
    line(x1, y1, x2, y2);
    line(x2, y2, x3, y3);
    line(x3, y3, x1, y1);
    // Rotate the triangle by 30 degrees
    double theta = 30;
    rotateTriangle(x1, y1, x2, y2, x3, y3, theta);
    // Delay to see the result
    delay(5000);
    // Close graphics mode
    closegraph();
    return 0;
}
```

Program output:



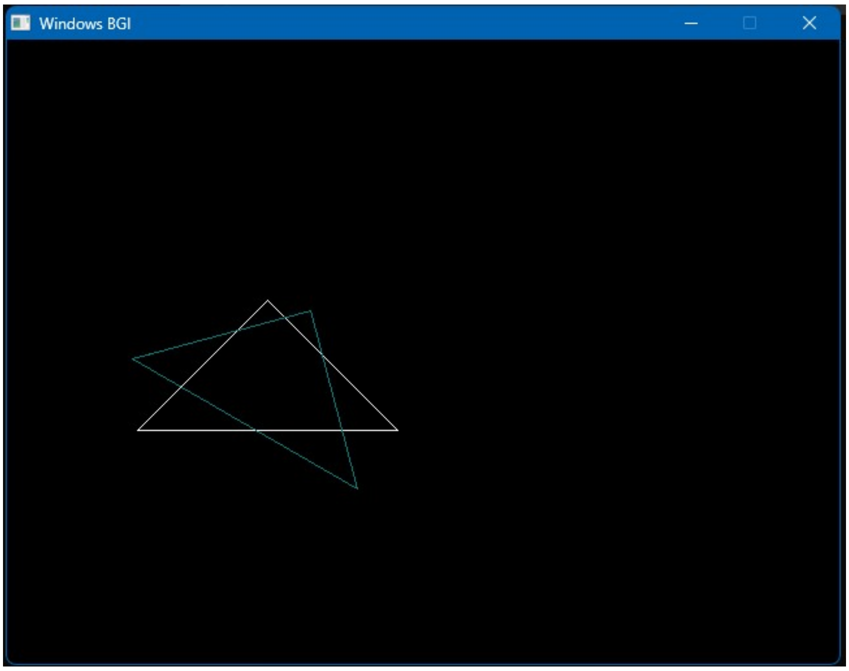
PROGRAM NUMBER: 15

Rotate a triangle with coordinates (200,100), (100,300), (300,300) by 30 degrees with respect to the Centroid.

Program code:

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

void drawTriangle(int x1, int y1, int x2, int y2, int x3, int y3)
{
    line(x1, y1, x2, y2);
    line(x2, y2, x3, y3);
    line(x3, y3, x1, y1);
}

void rotateTriangle(int x1, int y1, int x2, int y2, int x3, int y3, float
angle)
{
    // Calculate centroid
    int centroid_x = (x1 + x2 + x3) / 3;
    int centroid_y = (y1 + y2 + y3) / 3;

    // Convert angle from degrees to radians
    float radian = angle * (M_PI / 180.0);

    // Apply rotation transformation to each vertex
    int new_x1 = centroid_x + (x1 - centroid_x) * cos(radian) - (y1 -
centroid_y) * sin(radian);
    int new_y1 = centroid_y + (x1 - centroid_x) * sin(radian) + (y1 -
centroid_y) * cos(radian);
    int new_x2 = centroid_x + (x2 - centroid_x) * cos(radian) - (y2 -
centroid_y) * sin(radian);
    int new_y2 = centroid_y + (x2 - centroid_x) * sin(radian) + (y2 -
centroid_y) * cos(radian);
    int new_x3 = centroid_x + (x3 - centroid_x) * cos(radian) - (y3 -
centroid_y) * sin(radian);
    int new_y3 = centroid_y + (x3 - centroid_x) * sin(radian) + (y3 -
centroid_y) * cos(radian);

    // Draw the rotated triangle
    setcolor(CYAN);
    drawTriangle(new_x1, new_y1, new_x2, new_y2, new_x3, new_y3);
}

int main()
{
    int gd, gm;
    gd = DETECT;
    initgraph(&gd, &gm, "");

    // Coordinates of the original triangle
    int x1 = 200, y1 = 200;
    int x2 = 100, y2 = 300;
    int x3 = 300, y3 = 300;

    // Draw the original triangle
    drawTriangle(x1, y1, x2, y2, x3, y3);

    // Rotate the triangle by 30 degrees
    float angle = 30.0;
    rotateTriangle(x1, y1, x2, y2, x3, y3, angle);

    delay(50000); // Delay for 5 seconds to see the result

    closegraph();
    return 0;
}
```

Program output:



PROGRAM NUMBER: 16

Consider a clipping window defined by the coordinates (100, 300) and (400, 100) and the lines with the following endpoints:

4. (150, 275), (300, 150)
5. (300, 350), (450, 350)
6. (200, 50), (500, 250)

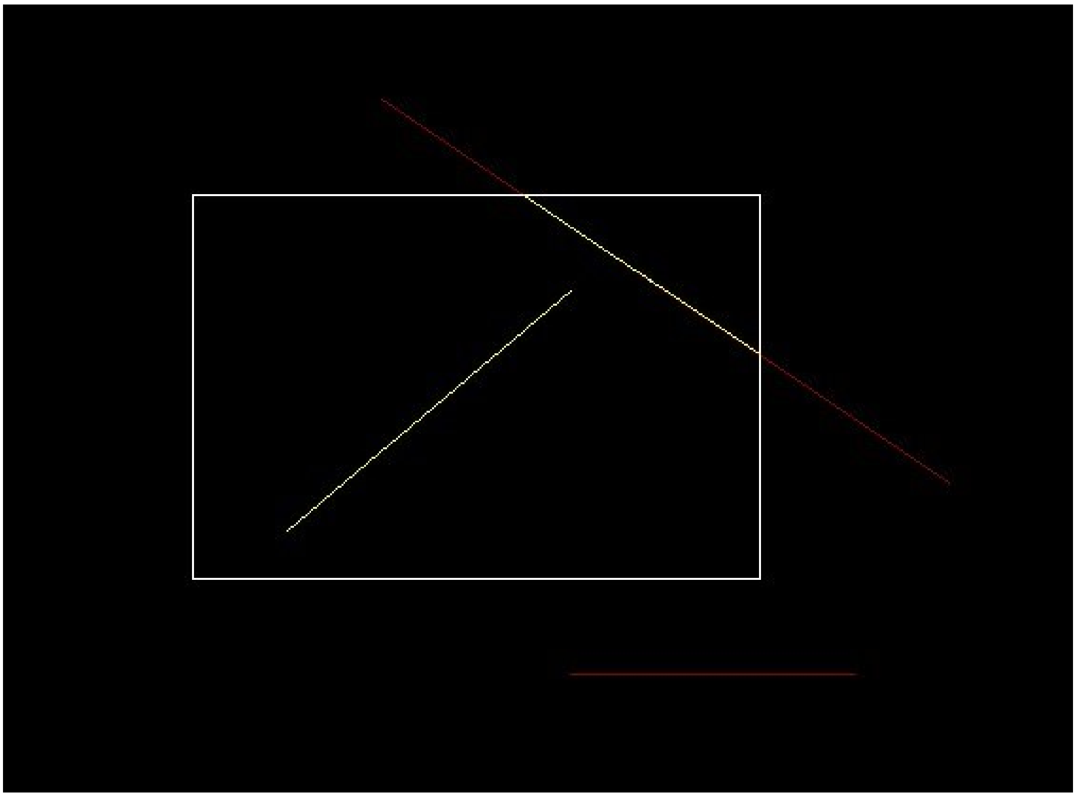
Use Cohen Sutherland Clipping algorithm to display lines in different color and clip the part of lines which is outside the window

Program code:

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

// Define the clipping window coordinates
int xmin = 100, ymin = 100;
```

```c
int xmax = 400, ymax = 300;

// Define the region codes
#define INSIDE 0
#define LEFT 1
#define RIGHT 2
#define BOTTOM 4
#define TOP 8

// Calculate the region code for a given point
int calculateRegionCode(int x, int y)
{
    int code = INSIDE;

    if (x < xmin)
        code |= LEFT;
    else if (x > xmax)
        code |= RIGHT;

    if (y < ymin)
        code |= BOTTOM;
    else if (y > ymax)
        code |= TOP;

    return code;
}

// Clip the line using the Cohen-Sutherland algorithm
void cohenSutherlandClip(int x1, int y1, int x2, int y2)
{
    int code1 = calculateRegionCode(x1, y1);
    int code2 = calculateRegionCode(x2, y2);
    int accept = 0;

    while (1)
    {
        if ((code1 == 0) && (code2 == 0))
        {
            accept = 1; // Line is completely inside the window
            break;
        }
        else if (code1 & code2)
        {
            break; // Line is completely outside the window
        }
        else
        {
            int x, y;
            int code = (code1 != 0) ? code1 : code2;

            if (code & TOP)
            {
                x = x1 + (x2 - x1) * (ymax - y1) / (y2 - y1);
                y = ymax;
            }
            else if (code & BOTTOM)
            {
                x = x1 + (x2 - x1) * (ymin - y1) / (y2 - y1);
                y = ymin;
            }
            else if (code & RIGHT)
            {
                y = y1 + (y2 - y1) * (xmax - x1) / (x2 - x1);
                x = xmax;
            }
            else if (code & LEFT)
            {
                y = y1 + (y2 - y1) * (xmin - x1) / (x2 - x1);
                x = xmin;
            }

            if (code == code1)
            {
                x1 = x;
                y1 = y;
                code1 = calculateRegionCode(x1, y1);
            }
            else
            {
                x2 = x;
                y2 = y;
                code2 = calculateRegionCode(x2, y2);
            }
        }
    }

    if (accept)
    {
        setcolor(YELLOW);
        line(x1, y1, x2, y2); // Display the clipped line in yellow
    }
}

int main()
{
    int gd = DETECT, gm;
    initgraph(&gd, &gm, "C:\\TC\\BGI"); // Update the path according to
your setup

    setcolor(WHITE);
    rectangle(xmin, ymin, xmax, ymax); // Display the clipping window in
white

    // Define the line endpoints
    int lines[][4] = {
        {150, 275, 300, 150}, // Line 1
        {300, 350, 450, 350}, // Line 2
        {200, 50, 500, 250}   // Line 3
    };

    // Display and clip each line
    for (int i = 0; i < sizeof(lines) / sizeof(lines[0]); i++)
    {
        int x1 = lines[i][0];
        int y1 = lines[i][1];
        int x2 = lines[i][2];
        int y2 = lines[i][3];

        setcolor(RED);
        line(x1, y1, x2, y2); // Display the original line in red

        cohenSutherlandClip(x1, y1, x2, y2); // Clip the line
    }

    getch();
    closegraph();
    return 0;
}
```

Program output:



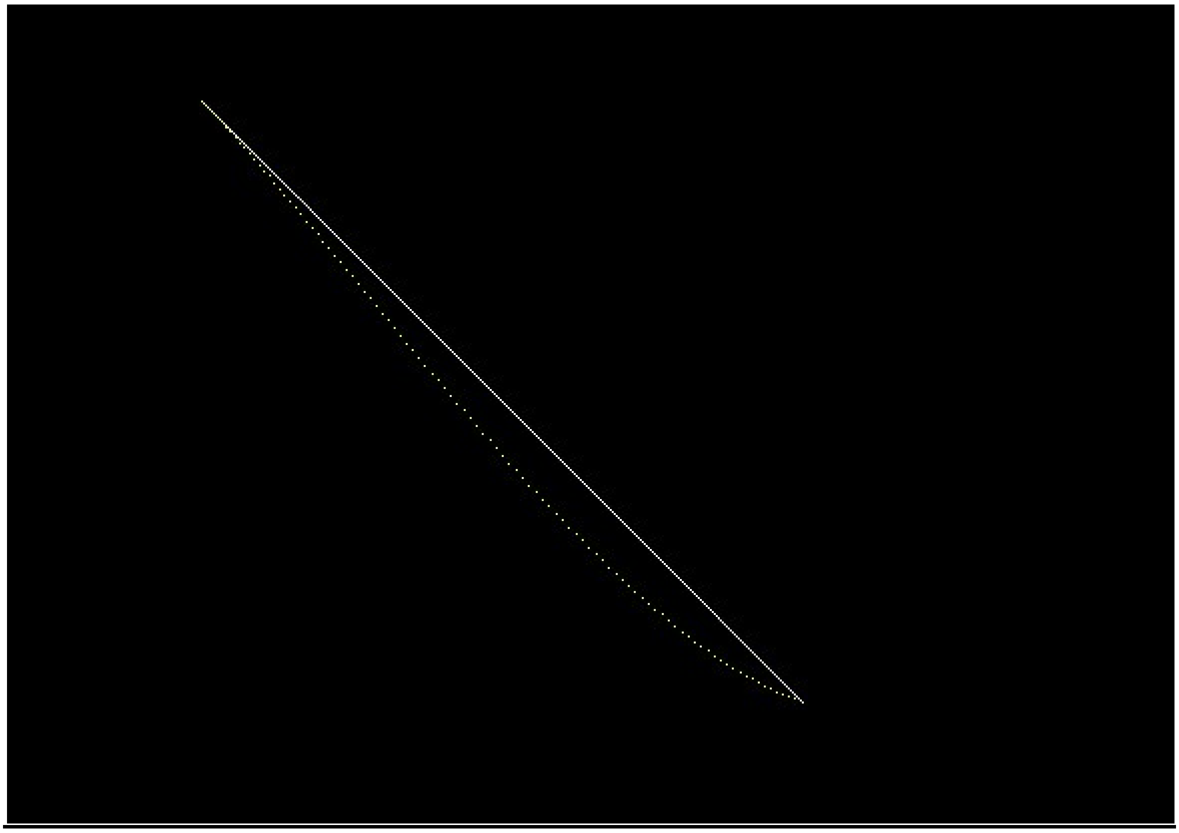
PROGRAM NUMBER: 17

Write a program to draw hermite curve

Program code:

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

// Hermite curve function
int hermite(int p0, int p1, int r0, int r1, double t)
{
    double t2 = t * t;
    double t3 = t2 * t;

    // Hermite basis functions
    double h1 = 2 * t3 - 3 * t2 + 1;
    double h2 = -2 * t3 + 3 * t2;
    double h3 = t3 - 2 * t2 + t;
    double h4 = t3 - t2;

    // Calculate and return the point on the Hermite curve
    return (int)(h1 * p0 + h2 * p1 + h3 * r0 + h4 * r1);
}

int main()
{
    int gd = DETECT, gm;
    initgraph(&gd, &gm, "C:\\TC\\BGI"); // Update the path according to
your setup

    int p0x = 100, p0y = 100; // Start point
    int p1x = 400, p1y = 400; // End point
    int r0x = 200, r0y = 200; // Start tangent
    int r1x = 300, r1y = 100; // End tangent

    double t;
    int x, y;

    setcolor(WHITE);
    line(p0x, p0y, p1x, p1y); // Draw the control line in white

    setcolor(YELLOW);
    for (t = 0; t <= 1; t += 0.01)
    {
        x = hermite(p0x, p1x, r0x, r1x, t);
        y = hermite(p0y, p1y, r0y, r1y, t);
        putpixel(x, y, YELLOW);
    }

    getch();
    closegraph();
    return 0;}
```

Program output:



PROGRAM NUMBER: 18

Write a program to draw beizer curve

Program code:

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

// Bezier curve function
int bezier(int p0, int p1, int p2, int p3, double t)
{
    double t2 = t * t;
    double t3 = t2 * t;

    // Bezier basis functions
    double b1 = -t3 + 3 * t2 - 3 * t + 1;
    double b2 = 3 * t3 - 6 * t2 + 3 * t;
    double b3 = -3 * t3 + 3 * t2;
    double b4 = t3;
    // Calculate and return the point on the Bezier curve
    return (int)(b1 * p0 + b2 * p1 + b3 * p2 + b4 * p3);
}

int main(){
    int gd = DETECT, gm;
    initgraph(&gd, &gm, "C:\\TC\\BGI"); // Update the path according to
your setup

    int p0x = 100, p0y = 100; // Start point
    int p1x = 150, p1y = 300; // Control point 1
    int p2x = 300, p2y = 50;  // Control point 2
    int p3x = 400, p3y = 200; // End point

    double t;
    int x, y;

    setcolor(WHITE);
    line(p0x, p0y, p1x, p1y); // Draw the control lines in white
    line(p2x, p2y, p3x, p3y);

    setcolor(YELLOW);
    for (t = 0; t <= 1; t += 0.01)
    {
        x = bezier(p0x, p1x, p2x, p3x, t);
        y = bezier(p0y, p1y, p2y, p3y, t);
        putpixel(x, y, YELLOW);
    }

    getch();
    closegraph();
    return 0;}
```

Program output: