VIVEKANANDA INSTITUTE OF PROFESSIONAL STUDIES
VIVEKANANDA SCHOOL OF INFORMATION TECHNOLOGY

BACHELOR OF COMPUTER APPLICATION
Practical- CG LAB File
BCA-373

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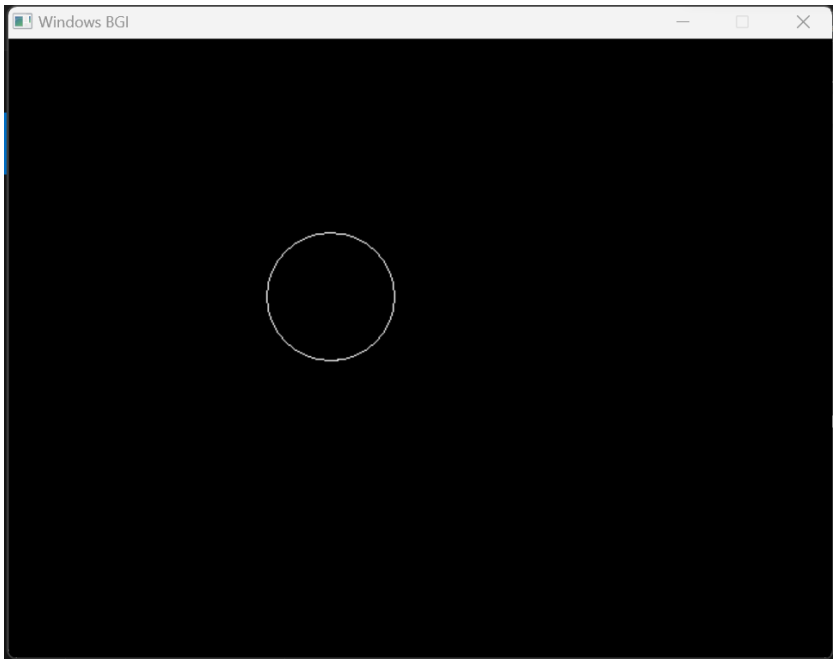
Ques. Drawing objects like circle, rectangle, polygon using graphic function

Code –

```
#include <graphics.h>
int main() {
    int gd = DETECT, gm;
    initgraph(&gd, &gm, "");
    circle(250, 200, 50);
    getch();
    closegraph();
    return 0;
}
```

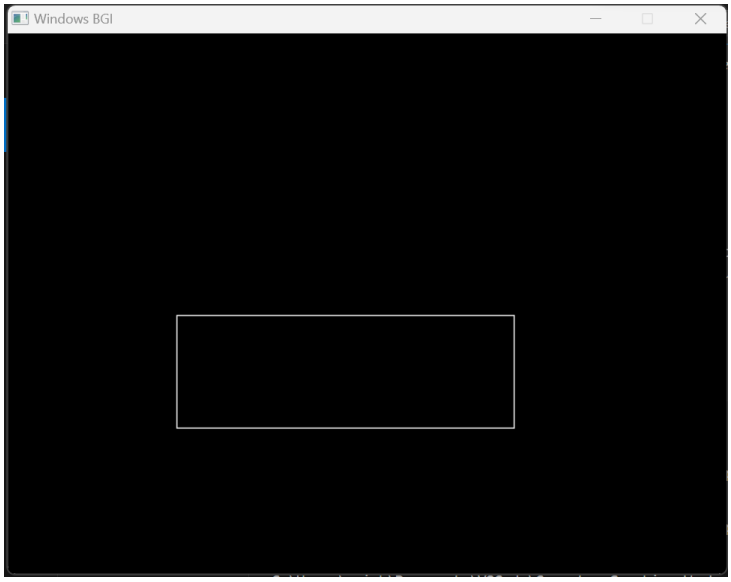
Output –



Code –

```
#include <graphics.h>
int main() {
   int gd = DETECT, gm;
   int left = 150, top = 250;
   int right = 450, bottom = 350;
   initgraph(&gd, &gm, "");
   rectangle(left, top, right, bottom);
   getch();
   closegraph();
   return 0;
}
```

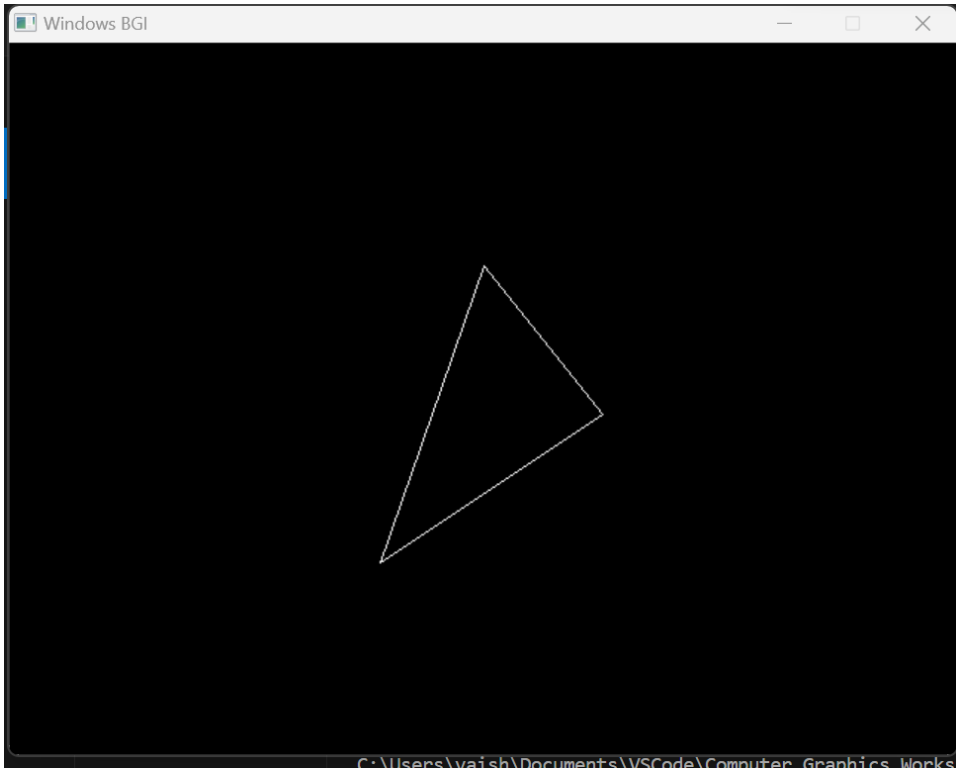
Output –



Code –

```
#include <graphics.h>
int main() {
    int gd = DETECT, gm;
    int arr[] = {320, 150, 400, 250, 250, 350, 320, 150};
    initgraph(&gd, &gm, "");
    drawpoly(4, arr);
    getch();
    closegraph();
    return 0;
}
```

Output –

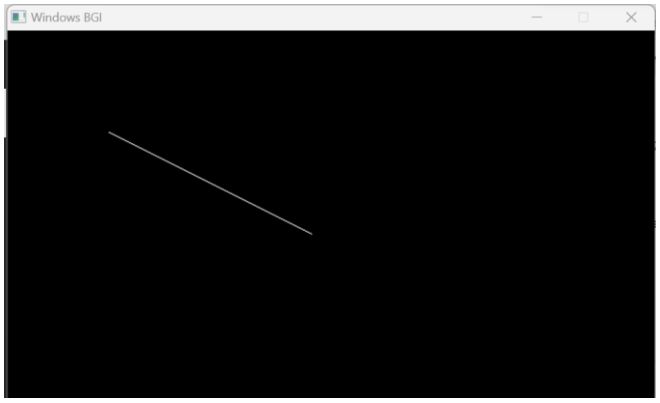


Ques. Line Drawing Algorithms (DDA & Bresenham's Algorithm)

Code – DDA

```
#include <graphics.h>
void drawLineDDA(int X1, int Y1, int X2, int Y2) {
   int dx = X2 - X1;
   int dy = Y2 - Y1;
   int steps = abs(dx) > abs(dy) ? abs(dx) : abs(dy);
   float Xinc = dx / (float) steps;
   float Yinc = dy / (float) steps;
   float X = X1;
   float Y = Y1;
   for (int i = 0; i <= steps; i++) {
      putpixel(X, Y, WHITE);  // assuming WHITE is defined as 15 in graphics.h
      X += Xinc;
      Y += Yinc;
   }
}
int main() {
   int gd = DETECT, gm;
   initgraph(&gd, &gm, "");
   int X1 = 100, Y1 = 100, X2 = 300, Y2 = 200;
   drawLineDDA(X1, Y1, X2, Y2);
   getch();
   closegraph();
   return 0;
}
```

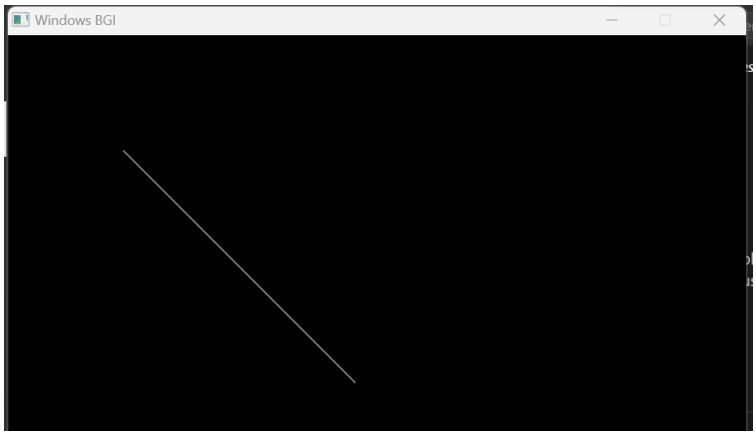
Output –



Code – Bresenham's

```
#include <graphics.h>
void drawLineBresenham(int X1, int Y1, int X2, int Y2) {
   int dx = abs(X2 - X1), dy = abs(Y2 - Y1);
   int slope_less_than_one = dy <= dx;
   int interchange_needed = 0;
   if (!slope_less_than_one && (interchange_needed = 1))
      dx += dy, dy = dx - dy, dx -= dy;
   int p = 2 * dy - dx;
   int twoDy = 2 * dy, twoDyMinusDx = 2 * (dy - dx);
   for (int X = X1, Y = Y1; X <= X2; X++, p += slope_less_than_one ? twoDy :
twoDyMinusDx) {
      putpixel(slope_less_than_one ? X : Y, slope_less_than_one ? Y : X, WHITE);
      if (p >= 0)
         Y++, p -= slope_less_than_one ? dx : twoDyMinusDx;
   }
}
int main() {
   int gd = DETECT, gm;
   initgraph(&gd, &gm, "");
   int X1 = 100, Y1 = 100, X2 = 300, Y2 = 200;
   drawLineBresenham(X1, Y1, X2, Y2);
   getch();
   closegraph();
   return 0;
}
```

Output –

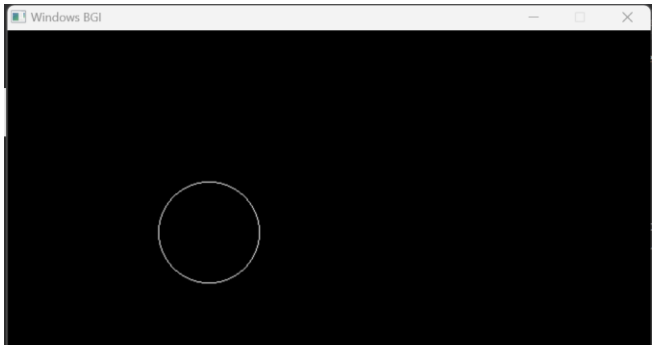


Ques. Circle Algorithms

Code – Bresenham

```
#include <graphics.h>
void drawCircleBresenham(int xc, int yc, int r) {
    int x = 0, y = r;
    int p = 3 - 2 * r;
    while (x <= y) {
        putpixel(xc + x, yc + y, 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 + y, yc - x, WHITE);
        putpixel(xc - y, yc - x, WHITE);
        if (p < 0)
            p += 4 * x++ + 6;
        else
            p += 4 * (x++ - y--) + 10;
    }
}
int main() {
    int gd = DETECT, gm;
    initgraph(&gd, &gm, "");
    int xc = 200, yc = 200, r = 50;
    drawCircleBresenham(xc, yc, r);
    getch();
    closegraph();
    return 0;
}
```

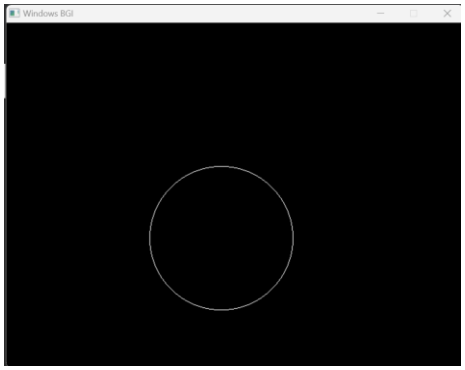
Output –



Code – Midpoint Circle

```
 #include <graphics.h>
void drawCircleMidpoint(int xc, int yc, int r) {
    int x = r, y = 0;
    int p = 1 - r;
    while (x >= y) {
        putpixel(xc + x, yc - y, 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 + y, yc + x, WHITE);
        putpixel(xc - y, yc + x, WHITE);
        y++;
        if (p <= 0)
            p = p + 2*y + 1;
        else {
            x--;
            p = p + 2*y - 2*x + 1;
      }
    }
int main() {
    int gd = DETECT, gm;
    initgraph(&gd, &gm, "");
    int xc = 200, yc = 200, r = 50;
    drawCircleMidpoint(xc, yc, r);
    getch();
    closegraph();
    return 0;
}
```

Output –

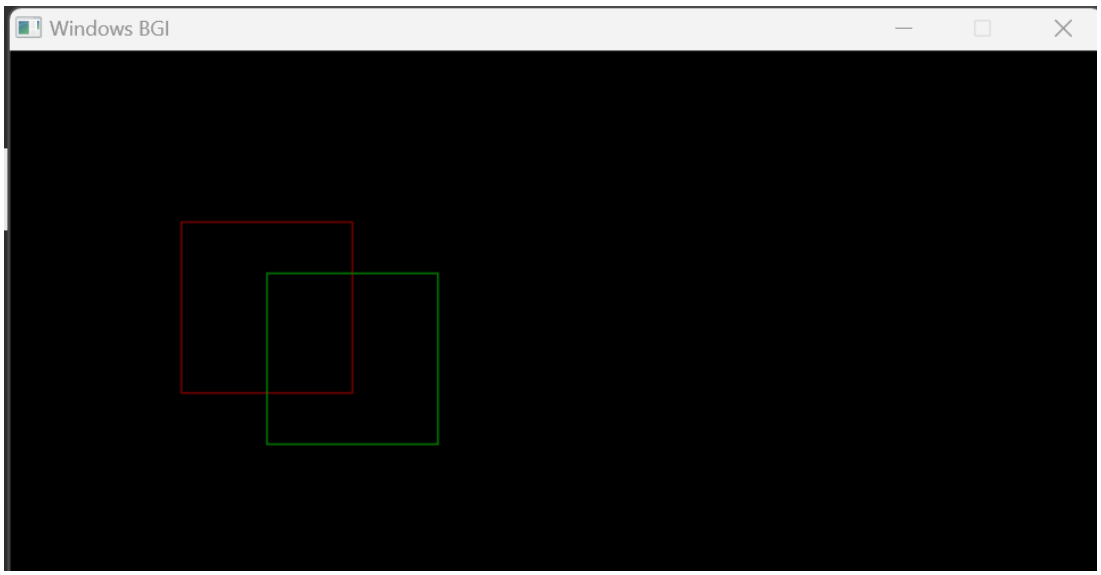


Ques. Translation in 2D

Code –

```
#include <graphics.h>
void drawSquare(int x, int y, int side) {
   rectangle(x, y, x + side, y + side);
}
void translateSquare(int x, int y, int tx, int ty, int side) {
   setcolor(RED);
   drawSquare(x, y, side);
   setcolor(GREEN);
   drawSquare(x + tx, y + ty, side);
}
int main() {
   int gd = DETECT, gm;
   initgraph(&gd, &gm, "");
   int x = 100, y = 100, side = 50;
   int tx = 50, ty = 30;
   translateSquare(x, y, tx, ty, side);
   getch();
   closegraph();
   return 0;
}
```

Output –

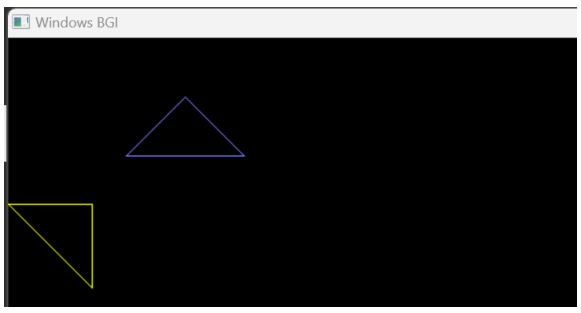


Ques. Rotation in 2D

Code –

```
#include <graphics.h>
#include <math.h>
void drawTriangle(int x1, int y1, int x2, int y2, int x3, int y3, int color) {
   setcolor(color);
   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, int angle) {
   drawTriangle(x1, y1, x2, y2, x3, y3, LIGHTBLUE);
   setcolor(YELLOW);
   float angleRad = angle * M_PI / 180;
   int new_x1 = round(x1 * cos(angleRad) - y1 * sin(angleRad));
   int new_y1 = round(x1 * sin(angleRad) + y1 * cos(angleRad));
   int new_x2 = round(x2 * cos(angleRad) - y2 * sin(angleRad));
   int new_y2 = round(x2 * sin(angleRad) + y2 * cos(angleRad));
   int new_x3 = round(x3 * cos(angleRad) - y3 * sin(angleRad));
   int new_y3 = round(x3 * sin(angleRad) + y3 * cos(angleRad));
   drawTriangle(new_x1, new_y1, new_x2, new_y2, new_x3, new_y3, YELLOW);  }
int main() {
   int gd = DETECT, gm;
   initgraph(&gd, &gm, "");
   int x1 = 100, y1 = 100;
   int x2 = 200, y2 = 100;
   int x3 = 150, y3 = 50;
   int angle = 45;
   rotateTriangle(x1, y1, x2, y2, x3, y3, angle);
   getch();
   closegraph();
   return 0;
}
```

Output –

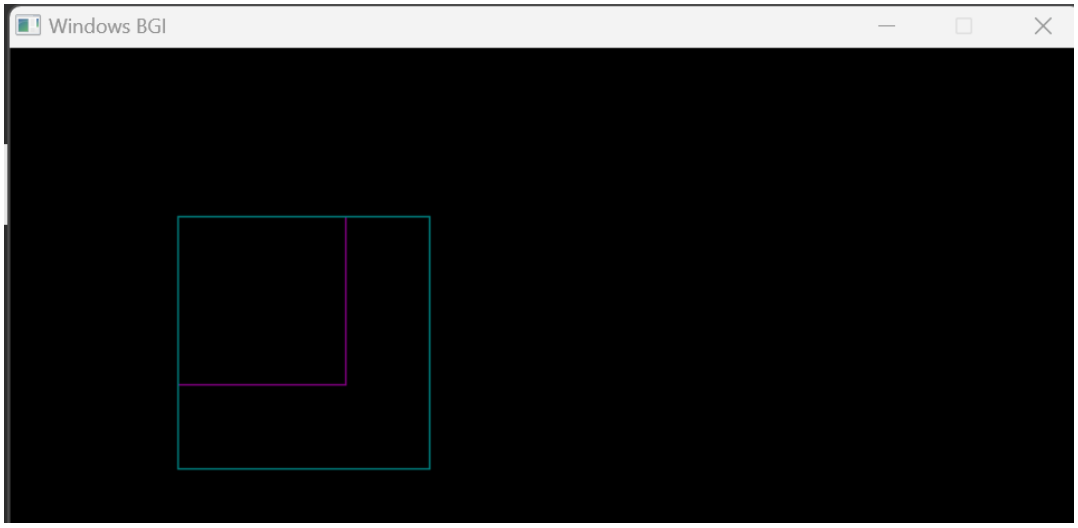


Ques. Scaling in 2D

Code –

```
#include <graphics.h>
void drawSquare(int x, int y, int side) {
    rectangle(x, y, x + side, y + side);
}
void scaleSquare(int x, int y, float scale_factor, int side) {
    setcolor(MAGENTA);
    drawSquare(x, y, side);  // Original square in magenta
    setcolor(CYAN);
    drawSquare(x, y, scale_factor * side);  // Scaled square in cyan
}
int main() {
    int gd = DETECT, gm;
    initgraph(&gd, &gm, "");
    int x = 100, y = 100, side = 100;  // Larger square
    float scale_factor = 1.5;
    scaleSquare(x, y, scale_factor, side);
    getch();
    closegraph();
    return 0;
}
```

Output –

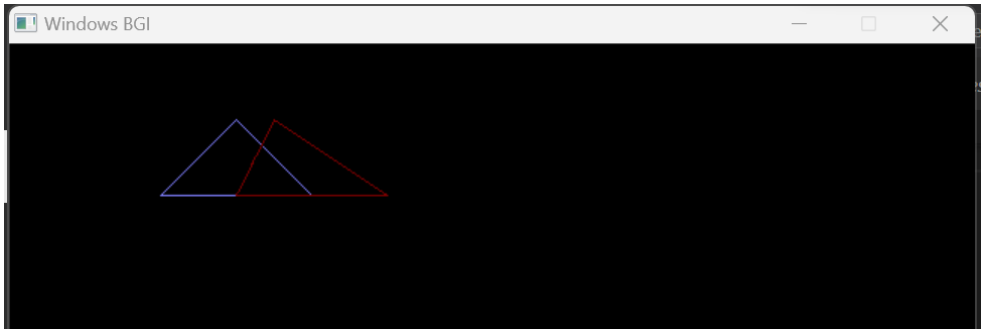


Ques. Shearing in 2D

Code –

```
#include <graphics.h>
#include <stdio.h>
void drawTriangle(int x1, int y1, int x2, int y2, int x3, int y3, int color) {
   setcolor(color);
   line(x1, y1, x2, y2);
   line(x2, y2, x3, y3);
   line(x3, y3, x1, y1);
}
void shearTriangle(int x1, int y1, int x2, int y2, int x3, int y3, float shearFactor) {
   drawTriangle(x1, y1, x2, y2, x3, y3, LIGHTBLUE);
   setcolor(RED);
   int new_x1 = x1 + shearFactor * y1;
   int new_y1 = y1;
   int new_x2 = x2 + shearFactor * y2;
   int new_y2 = y2;
   int new_x3 = x3 + shearFactor * y3;
   int new_y3 = y3;
   drawTriangle(new_x1, new_y1, new_x2, new_y2, new_x3, new_y3, RED);
}
int main() {
   int gd = DETECT, gm;
   initgraph(&gd, &gm, "");
   int x1 = 100, y1 = 100;
   int x2 = 200, y2 = 100;
   int x3 = 150, y3 = 50;
   float shearFactor = 0.5;
   shearTriangle(x1, y1, x2, y2, x3, y3, shearFactor);
   getch();
   closegraph();
   return 0;
}
```

Output –



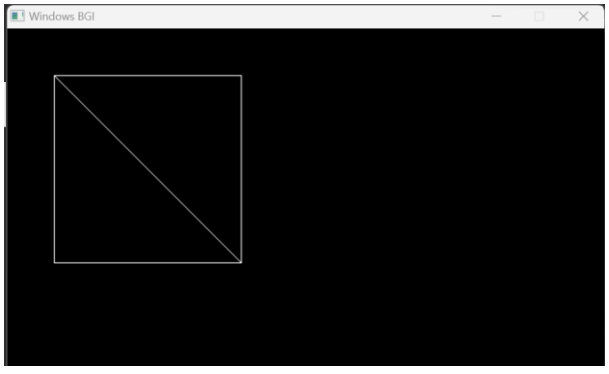
Ques. Cohen Sutherland's Algorithm

Code –

```
#include <graphics.h>
#define INSIDE 0 // 0000
#define LEFT 1   // 0001
#define RIGHT 2  // 0010
#define BOTTOM 4 // 0100
#define TOP 8    // 1000
int x_max, y_max, x_min, y_min;
int computeCode(int x, int y) {
   int code = INSIDE;
   if (x < x_min)
      code |= LEFT;
   else if (x > x_max)
      code |= RIGHT;
   if (y < y_min)
      code |= BOTTOM;
   else if (y > y_max)
      code |= TOP;
   return code;
}
void cohenSutherland(int x1, int y1, int x2, int y2) {
   int code1 = computeCode(x1, y1);
   int code2 = computeCode(x2, y2);
   int accept = 0;
   while (1) {
      if (!(code1 | code2)) {
         accept = 1;
         break;
      } else if (code1 & code2) {
         break;
      } else {
         int code_out;
         int x, y;
         if (code1 != 0)
            code_out = code1;
         else
            code_out = code2;
         if (code_out & TOP) {
            x = x1 + (x2 - x1) * (y_max - y1) / (y2 - y1);
            y = y_max;
         } else if (code_out & BOTTOM) {
```

```
            x = x1 + (x2 - x1) * (y_min - y1) / (y2 - y1);
            y = y_min;
         } else if (code_out & RIGHT) {
            y = y1 + (y2 - y1) * (x_max - x1) / (x2 - x1);
            x = x_max;
         } else if (code_out & LEFT) {
            y = y1 + (y2 - y1) * (x_min - x1) / (x2 - x1);
            x = x_min;
         }
         if (code_out == code1) {
            x1 = x;
            y1 = y;
            code1 = computeCode(x1, y1);
         } else {
            x2 = x;
            y2 = y;
            code2 = computeCode(x2, y2);
         }
      }
   }
int main() {
   int gd = DETECT, gm;
   initgraph(&gd, &gm, "");
   x_min = 50;
   y_min = 50;
   x_max = 250;
   y_max = 250;
   rectangle(x_min, y_min, x_max, y_max);
   cohenSutherland(30, 30, 300, 300);
   getch();
   closegraph();
   return 0;
}
```

Output –



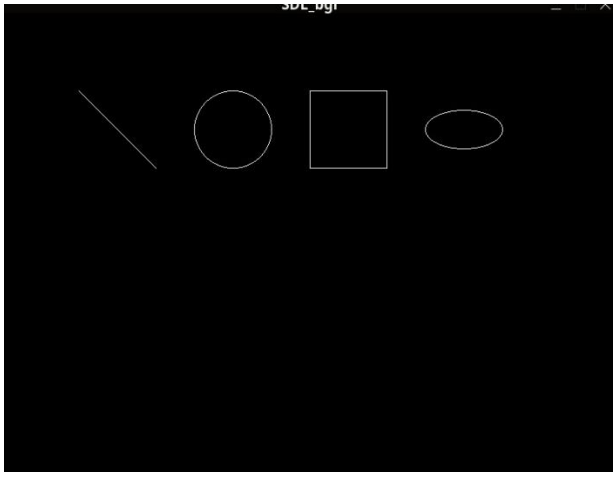
Ques. Graphics Inbuilt functions

Code –

```
#include <graphics.h>

int main()
{
   int gd = DETECT, gm;
   initgraph(&gd, &gm, NULL);
   line(100, 100, 200, 200);
   circle(300, 150, 50);
   rectangle(400, 100, 500, 200);
   ellipse(600, 150, 0, 360, 50, 25);
   getch();
   closegraph();
}
```

Output –



Ques. Reflection in 2D

Code –

```
#include <graphics.h>
void drawOriginalShape() {
   setcolor(RED);
   rectangle(100, 100, 200, 200);
}
void drawReflectedShape() {
   setcolor(BLUE);
   rectangle(100, getmaxy() - 100, 200, getmaxy() - 200);
}
int main() {
   int gd = DETECT, gm;
   initgraph(&gd, &gm, NULL);
   drawOriginalShape();
   delay(2000);
   cleardevice();
   drawReflectedShape();
   getch();
   closegraph();
   return 0;
}
```

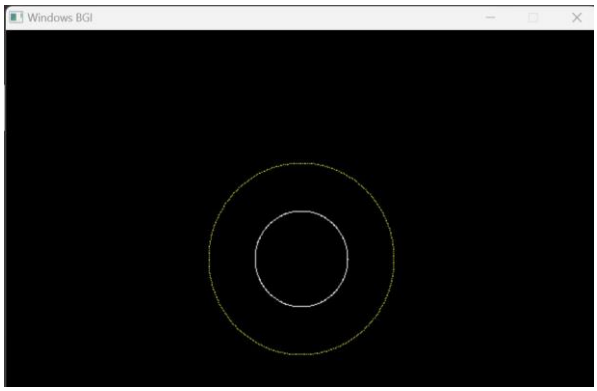
Output –

Ques. Program to rotate a circle outside another circle

Code –

```
#include <graphics.h>
#include <math.h>
void drawRotatingCircle(int xc, int yc, int outerRadius, int innerRadius, float outerAngle,
float innerAngle) {
   float theta;
   int x_outer, y_outer, x_inner, y_inner;
 for (theta = 0; theta <= 360; theta += 1) {
      x_outer = xc + outerRadius * cos((theta + outerAngle) * 3.14 / 180);
      y_outer = yc + outerRadius * sin((theta + outerAngle) * 3.14 / 180);
      putpixel(x_outer, y_outer, YELLOW);
   }          for (theta = 0; theta <= 360; theta += 1) {
      x_inner = xc + innerRadius * cos((theta + innerAngle) * 3.14 / 180);
      y_inner = yc + innerRadius * sin((theta + innerAngle) * 3.14 / 180);
      putpixel(x_inner, y_inner, WHITE);
   }}
int main() {
   int gd = DETECT, gm;
   initgraph(&gd, &gm, "");
   int xc = getmaxx() / 2;
   int yc = getmaxy() / 2;
   int outerRadius = 100; int innerRadius = 50;float outerAngle = 0;float innerAngle = 0;
   while (!kbhit()) {
      cleardevice();
      drawRotatingCircle(xc, yc, outerRadius, innerRadius, outerAngle, innerAngle);
      innerAngle -= 3;
   }
   getch();
   closegraph();
   return 0;
}
```

Output –

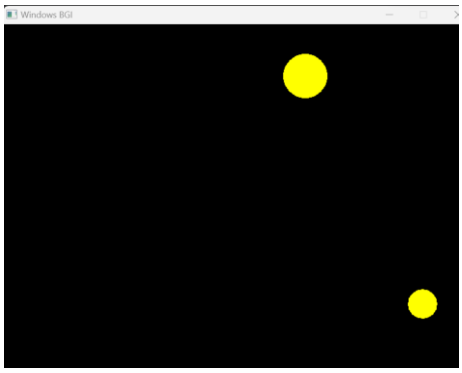


Ques. Program to draw Flying Balloons

Code –

```
#include <graphics.h>
#include <stdlib.h>
void drawBalloon(int x, int y, int radius) {
   setcolor(YELLOW);
   setfillstyle(SOLID_FILL, YELLOW);
   circle(x, y, radius);
   floodfill(x, y, YELLOW);
}
void moveBalloon(int &x, int &y, int speed) {
   x += speed;
   if (x > getmaxx() + 50) {
      x = -50;
      y = rand() % (getmaxy() - 50) + 50;
   }
}
int main() {
   int gd = DETECT, gm;
   initgraph(&gd, &gm, "");
   int x1 = 50, y1 = 100;
   int x2 = 150, y2 = 200;
    for (int i = 0; i < 1000; ++i) {
      cleardevice();
      drawBalloon(x1, y1, 20);
      drawBalloon(x2, y2, 30);
      moveBalloon(x1, y1, 2);
      moveBalloon(x2, y2, 1);
      delay(10);
   }
   getch();
   closegraph();
   return 0;
}
```

Output –

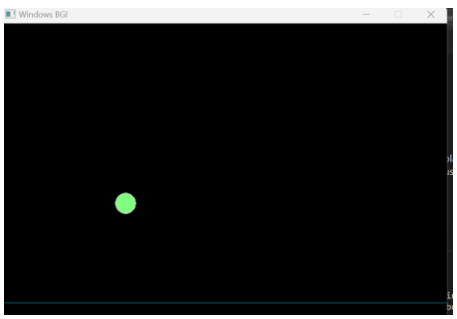


Ques. Show Bouncing Ball Animation

Code –

```
#include <graphics.h>
int main() {
    int gd = DETECT, gm;
    initgraph(&gd, &gm, NULL);
    int x = 20, y = 200, dy = 2, uplimit = 250;
    while (true) {
        cleardevice();
        setcolor(3);
        line(0, 400, 679, 400);
        y += dy;
        x += 1;
        if (y >= 385 && dy > 0) {
            dy = -dy;
        } else if (y <= uplimit && dy < 0) {
            dy = -dy;
            uplimit += 20;
        }
        setcolor(15);
        fillellipse(x, y, 15, 15);
        delay(15);
        setcolor(0);
        setfillstyle(1, 10);
        fillellipse(x, y, 15, 15);
    }
    getch();
    closegraph();
    return 0;
}
```

Output –

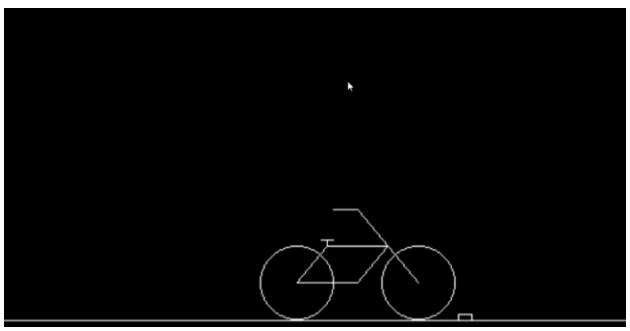


Ques. Draw a moving cycle

Code –

```
#include <conio.h>
#include <dos.h>
#include <graphics.h>
#include <iostream.h>
int main() {
        int gd = DETECT, gm, i, a;
        initgraph(&gd, &gm, );
        for (i = 0; i < 600; i++) {
                // Upper body of cycle
                line(50 + i, 405, 100 + i, 405);
                line(75 + i, 375, 125 + i, 375);
                line(50 + i, 405, 75 + i, 375);
                line(100 + i, 405, 100 + i, 345);
                line(150 + i, 405, 100 + i, 345);
                line(75 + i, 345, 75 + i, 370);
                line(70 + i, 370, 80 + i, 370);
                line(80 + i, 345, 100 + i, 345);
                circle(150 + i, 405, 30);
                circle(50 + i, 405, 30);
                line(0, 436, getmaxx(), 436);
                rectangle(getmaxx() - i, 436,
                                650 - i, 431);
                delay(10);
                cleardevice();
        }
        getch();
        closegraph();
}
```

Output –



Ques. Show Moving Car Animation.

Code –

```
#include <graphics.h>
#include <stdio.h>
void draw_moving_car(void) {
   int i, j = 0, gd = DETECT, gm;
   initgraph(&gd, &gm, "");
   for (i = 0; i <= 420; i = i + 10) {
      setcolor(RED);
         line(0 + i, 300, 210 + i, 300);
         line(50 + i, 300, 75 + i, 270);
         line(75 + i, 270, 150 + i, 270);
         line(150 + i, 270, 165 + i, 300);
         line(0 + i, 300, 0 + i, 330);
         line(210 + i, 300, 210 + i, 330);
         circle(65 + i, 330, 15);
         circle(65 + i, 330, 2);
         circle(145 + i, 330, 15);
         circle(145 + i, 330, 2);
         line(0 + i, 330, 50 + i, 330);
         line(80 + i, 330, 130 + i, 330);
         line(210 + i, 330, 160 + i, 330);
         delay(100);
      setcolor(BLACK);
      line(210 + i, 300, 210 + i, 330);
      circle(65 + i, 330, 15);
      circle(65 + i, 330, 2);
      circle(145 + i, 330, 15);
      circle(145 + i, 330, 2);
      line(0 + i, 330, 50 + i, 330);
      line(80 + i, 330, 130 + i, 330);
      line(210 + i, 330, 160 + i, 330);}
   getch();
   closegraph();}
int main() {
   draw_moving_car();
   return 0;}
```

Output –