EXERCISE - 2

AIM : To implement Bresenham's circle-drawing algorithm in C to draw a circle on a graphical interface..

Procedure (Using Bresenham's Algorithm)

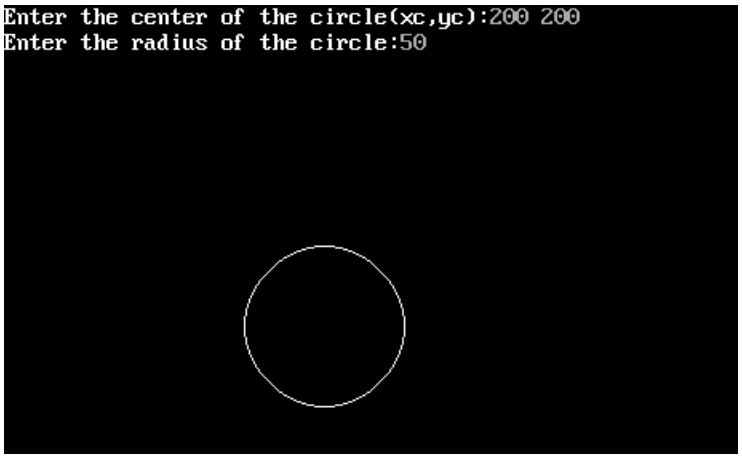
1. Input the radius and center coordinates (xc,yc).
2. Initialize parameters:
    - Start from the point (0,r)on the circle.
    - Compute the initial decision parameter:
      $p=3-2r$.
3. Plot initial points:
    - Using symmetry, plot points in all 8 octants of the circle based on (x,y).
4. Update decision parameter:
    - If $p<0$, the next point is $(x+1,y)$. Update p as:
      $p=p+4x+6$
    - Otherwise, the next point is $(x+1,y-1)$. Update p as:
      $p=p+4(x-y)+10$.
5. Repeat until $x \geq y$:
    - Continue plotting points in all octants.

SAMPLE CODE:

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

void plotCirclePoints(int xc, int yc, int x, int y) {
   putpixel(xc + x, yc + y, WHITE); // Octant 1
   putpixel(xc - x, yc + y, WHITE); // Octant 2
   putpixel(xc + x, yc - y, WHITE); // Octant 3
   putpixel(xc - x, yc - y, WHITE); // Octant 4
   putpixel(xc + y, yc + x, WHITE); // Octant 5
   putpixel(xc - y, yc + x, WHITE); // Octant 6
   putpixel(xc + y, yc - x, WHITE); // Octant 7
   putpixel(xc - y, yc - x, WHITE); // Octant 8
}
```

```
void bresenhamCircle(int xc, int yc, int r) {
    int x = 0, y = r;
    int p = 3 - 2 * r; // Initial decision parameter

    plotCirclePoints(xc, yc, x, y);

    while (x <= y) {
        x++;
        if (p < 0) {
            p = p + 4 * x + 6; // Mid-point inside or on the perimeter
        } else {
            y--;
            p = p + 4 * (x - y) + 10; // Mid-point outside the perimeter
        }
        plotCirclePoints(xc, yc, x, y);
    }
}

int main() {
    int gd = DETECT, gm;
    int xc, yc, r;

    // Initialize graphics mode
    initgraph(&gd, &gm, "C:\\TURBOC3\\BGI");

    // Input center and radius
    printf("Enter the center of the circle (xc, yc): ");
    scanf("%d %d", &xc, &yc);
    printf("Enter the radius of the circle: ");
    scanf("%d", &r);

    // Draw the circle
    bresenhamCircle(xc, yc, r);

    // Wait for user input and close the graphics window
    getch();
    closegraph();

    return 0;
}
```

OUTPUT


Enter the center of the circle(xc,yc):200 200
Enter the radius of the circle:50