LAB 2

OBJECTIVE: To implement and understand the Bresenham's Line Drawing Algorithm in C++ using Turbo C++ and graphics library functions.

THEORY:

The Bresenham's Line Drawing Algorithm is an efficient method used in computer graphics to draw a straight line between two points. It uses only integer calculations, which makes it faster than the DDA algorithm, especially on systems where floating-point operations are expensive.

Key Concepts:

- Works using decision parameters to determine the next pixel position.
- Uses only integer addition, subtraction, and multiplication.
- Ideal for raster devices (like monitors) where pixel locations are integers.

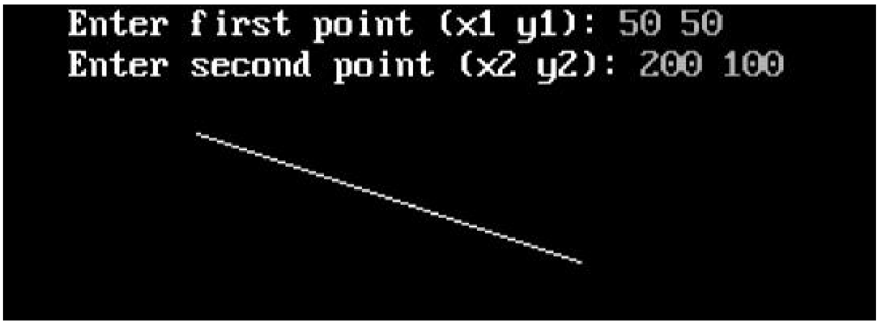
ALGORITHM:

```
1. Input the coordinates of the two endpoints (x1, y1) and (x2, y2).
2. Calculate dx = x2 - x1 and dy = y2 - y1.
3. Initialize the decision parameter m = 2*dy - dx.
4. Start at the first point (x1, y1).
5. For each step until x = x2:
    • Plot the pixel using putpixel(x, y).
    • Update the decision parameter m:
    • If m < 0: increment x and update m += 2*dy.
    • Else: increment both x and y, and update m += 2*dy - 2*dx.
```

PROGRAMS

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

int main() {
    int x, y, x1, y1, x2, y2, dx, dy, m, i;
    int gd = DETECT, gm;

    initgraph(&gd, &gm,"c:\\turboc3\\bgi");

    cout << "Enter first point (x1 y1): ";
    cin >> x1 >> y1;
    cout << "Enter second point (x2 y2): ";
    cin >> x2 >> y2;

    dx = x2 - x1;
    dy = y2 - y1;
    m = 2 * dy - dx;
    x = x1;
    y = y1;

    for(i=0; i <= dx; i++) {
      putpixel(x, y, WHITE);

      if (m < 0) {
          x = x + 1;
          m = m + 2 * dy;
      } else {
          x = x + 1;
          y = y + 1;
          m = m + 2 * dy - 2 * dx;
      }
    }

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

Output:



```
Enter first point (x1 y1): 50 50
Enter second point (x2 y2): 200 100
```

RESULTS:

The program successfully implements Bresenham’s Line Drawing Algorithm and draws a line between two points using only integer calculations.

CONCLUSION:

The experiment demonstrates the working of Bresenham’s algorithm. It is more efficient than the DDA algorithm for line drawing, especially in terms of performance since it avoids floating-point arithmetic.