BRESENHAM'S LINE ALGORITHM

(*Algorithm For All Cases*)

Input

- Start point (x_0,y_0) and end point (x_1,y_1).

Steps

1. Calculate differences:
    - $\Delta x = | x_1 - x_0 |$
    - $\Delta y = | y_1 - y_0 |$
2. Determine the Dominant Axis:
    - If $\Delta x >= \Delta y$, the line has a shallow slope ($|m| <= 1$).
    - If $\Delta x < \Delta y$, the line has a sleep slope ($|m| > 1$).
3. Set step Directions:
    - $S_x = 1$ if $x_1 > x_0$, otherwise $S_x = -1$.
    - $S_y = 1$ if $y_1 > y_0$, otherwise $S_y = -1$.
4. Initialize Decision parameter:
    - For shallow slopes ($|m| <= 1$):

      $P_0 = 2\Delta y - \Delta x$
    - For steep slopes ($|m|>1$):

      Swap role of x and y, and set:

      $P_0 = 2\Delta x - \Delta y$
5. Plot the Initial point:
    - Plot (x_0 , y_0)
6. Iterate until the end point is Reached:
    - For k=0 to the dominant axis length (Δx or Δy):

- For **shallow slopes** (|m| <= 1):
  - Increment x0 by S_x
  - If P_k >= 0:
    - Increment y_0 by S_y
    - Update : $P_{k+1} = P_k + 2\Delta y - 2\Delta x$
  - Else:
    - Update : $P_{k+1} = P_k + 2\Delta y$
- For **steep slopes** (|m| > 1):
  - Increment y0 by Sy
  - If Pk >= 0:
    - Increment x_0 by S_x
    - Update : $P_{k+1} = P_k + 2\Delta x - 2\Delta y$
  - Else:
    - Update : $P_{k+1} = P_k + 2\Delta x$
- Plot the new point (x_0 , y_0).

7. Terminate:
   - Stop when the end-point (x_1 , y_1) is plotted.

Output

- A sequence of plottes points (x , y) forming the rasterized line.