Ex. No. : 2 Date:

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Scan Conversion of Polygon and Area Filling using Flood-Fill Algorithm AIM:

To implement: 1. Scan conversion (drawing) of

a polygon.

2. Flood-fill algorithm to fill the polygonal area in a graphics window.

Procedure:

Polygon Scan Conversion:

1. Input the number of vertices and their coordinates.
2. Connect the vertices in order to draw polygon edges using line drawing algorithms.

Flood-Fill Algorithm:

1. Select a point inside the polygon as the seed point.
2. Recursively check neighboring pixels.
3. Replace target color with fill color if conditions match.

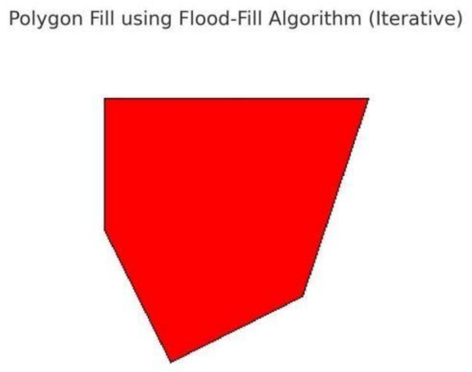
Program:

```
import matplotlib.pyplot as plt import
numpy as np
from collections import deque

width, height = 300, 300 canvas = np.ones((height, width, 3), dtype=np.uint8) * 255
# White canvas

def draw_polygon(vertices):     for
```

```
i in range(len(vertices)):
x1, y1 = vertices[i]
        x2, y2 = vertices[(i+1)%len(vertices)]
```

```
        bresenham_line(x1, y1, x2, y2)

def bresenham_line(x1, y1, x2, y2):
dx = abs(x2 - x1)     dy =
abs(y2 - y1)     x, y = x1, y1     sx
= 1 if x2 > x1 else -1     sy = 1 if
y2 > y1 else -1     if dx > dy:
err = dx / 2         while x != x2:
canvas[y, x] = [0, 0, 0]
            err -= dy             if err <
0:                y += sy
err += dx             x += sx
canvas[y, x] = [0, 0, 0]     else:
err = dy / 2         while y !=
y2:             canvas[y, x] = [0, 0,
0]             err -= dx             if
err < 0:                x += sx
err += dy             y += sy
canvas[y, x] = [0, 0, 0]

'''def flood_fill(x, y, target_color, fill_color):     if x < 0 or
x >= width or y < 0 or y >= height:          return      if not
np.array_equal(canvas[y, x], target_color):            return
canvas[y, x] = fill_color
flood_fill(x+1, y, target_color, fill_color)
flood_fill(x-1, y, target_color, fill_color)
flood_fill(x, y+1, target_color, fill_color)
    flood_fill(x, y-1, target_color, fill_color)
'''
def flood_fill_iter(x, y, target_color, fill_color):     target =
np.array(target_color, dtype=np.uint8)     fill =
np.array(fill_color, dtype=np.uint8)

            if x < 0 or x >= width or y < 0 or y >= height:
     return     if not np.array_equal(canvas[y, x], target):
        return

    q = deque([(x, y)])     while
q:
        cx, cy = q.popleft()         if cx < 0 or cx >= width or cy
< 0 or cy >= height:
```

```
            continue          if np.array_equal(canvas[cy,
cx], target):               canvas[cy,
cx] = fill_color
q.append((cx+1, cy))
            q.append((cx-1, cy))
            q.append((cx, cy+1))
            q.append((cx, cy-1))



# Main Execution
vertices = [(50, 50), (250, 50), (200, 200), (100, 250), (50, 150)]
draw_polygon(vertices) flood_fill_iter(150, 100, [255, 255, 255], [255,
0, 0])

plt.imshow(canvas) plt.title("Polygon Fill using Flood-
Fill Algorithm") plt.axis('off') plt.show()
```



Result:

A polygon will be drawn and filled with red color using the flood-fill algorithm.

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