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Grafika Komputer

1) Diketahui titik awal $P(1,1)$ dan titik akhir di $Q(10,10)$ dengan area clipping. $x_{min} = 1$, $y_{min} = 1$, $x_{max} = 7$, $y_{max} = 7$. Selesaikan masalah ini dengan Clipping Cohen-Sutherland!

Jawab:

*) Garis $P(1,1)$

$$L = 0 \quad \text{Karena } 1 < 1 \quad (x_{min})$$

$$R = 0 \quad \text{"} \quad 1 < 7 \quad (x_{max})$$

$$B = 0 \quad \text{Karena } 1 < 1 \quad (y_{min})$$

$$T = 0 \quad \text{"} \quad 1 < 7 \quad (y_{max})$$

} Vertex $P : 0000$

*) Garis $Q(10,10)$

$$L = 0 \quad \text{Karena } 10 > 1 \quad (x_{min})$$

$$R = 1 \quad \text{"} \quad 10 > 7 \quad (x_{max})$$

$$B = 0 \quad \text{Karena } 10 > 1 \quad (y_{min})$$

$$T = 1 \quad \text{"} \quad 10 > 7 \quad (y_{max})$$

} Vertex $Q : 0101$

\Rightarrow Region code $0000 \text{ AND } 0101 = 0000$

$$*) m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{10 - 1}{10 - 1} = \frac{9}{9} = 1$$

$$*) x_{p_1} = x_1 + \frac{y_{min} - y_1}{m}$$

$$= 1 + \frac{1 - 1}{1}$$

$$= 1 + \frac{0}{1} = 1$$

\therefore titik potong = (x_{p_1}, y_{min})
 $(1, 1)$ pada garis PQ

2) Berdasarkan soal no.1 lakukan Clipping menggunakan algoritma
Liang-Barsky dimana $x_l = 1$; $x_r = 7$, $y_b = 1$ dan $y_t = 7$

Jawab:

$$*) dx = x_2 - x_1 \quad \Leftrightarrow \quad dy = y_2 - y_1$$

$$= 10 - 1 = 9$$

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$$\left\{ \begin{array}{l} p_1 = -dx \\ \quad = -9 \\ p_2 = dx \\ \quad = 9 \\ p_3 = -dy \\ \quad = -9 \\ p_4 = dy \\ \quad = 9 \end{array} \right.$$

$$\left\{ \begin{array}{l} Q_1 = x_1 - x_l \\ \quad = 1 - 1 = 0 \\ Q_2 = x_r - x_1 \\ \quad = 7 - 1 = 6 \\ Q_3 = y_1 - y_b \\ \quad = 1 - 1 = 0 \\ Q_4 = y_t - y_1 \\ \quad = 7 - 1 = 6 \end{array} \right.$$

$$\Rightarrow \frac{Q_1}{p_1} = \frac{0}{-9} = 0$$

$$\therefore (p_1 < 0) T_1 = \max(0, 0, 0) = 0$$

$$\therefore (p_i > 0) T_2 = \min(2/3, 2/3, 1) = 2/3$$

$$\Rightarrow \frac{Q_2}{p_2} = \frac{6}{9} = \frac{2}{3}$$

$$\Rightarrow T_1 < T_2$$

$$\Rightarrow \frac{Q_3}{p_3} = \frac{0}{-9} = 0$$

$$*) T_1 = 0$$

$$x_1' = x_1 + dx \times T_1$$

$$= 1 + 9 \times 0 = 1$$

$$y_1' = y_1 + dy \times T_1$$

$$= 1 + 9 \times 0 = 1$$

$$\Rightarrow (x_1', y_1') \Rightarrow (1, 1)$$

$$*) T_2 = 2/3$$

$$x_2' = x_1 + dx \times T_2$$

$$= 1 + 9 \times 2/3 = 7$$

$$y_2' = y_1 + dy \times T_2$$

$$= 1 + 9 \times 2/3 = 7$$

$$\Rightarrow (x_2', y_2') \rightarrow (7, 7)$$