TS GKV 16/17 (2,3,5)

A(-4,-2) B (-7,7) "Algoritma Bresenham"

a. $x_1 = -4$, $x_2 = -7$
$y_1 = -2$; $y_2 = 7$

b. ~~x(0) = x1;~~ ~~dx~~ $dx = |x_2 - x_1|$; $dy = |y_2 - y_1|$
~~y(0) = y1;~~ $dx = 3$; $dy = 9$

c. {dx < dy}
$P_k = 2dx - dy$
$= 2(3) - 9$
$= -3$
step = dy
$= 9$

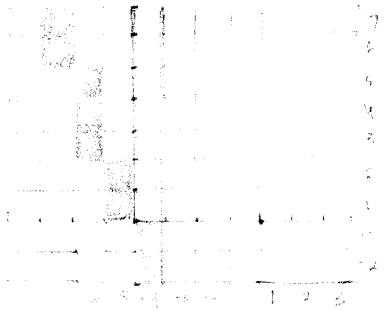
d. {(x1 > x2) & (y1 < y2)}
tambahX = -1
tambahY = 1

e. $x_k = x_1$, $y_k = y_1$
Gambar (x_k, y_k) ⇒ Gambar(-4,-2)

{ perulangan utk i = 1 s/d i = step

- i = 1 {dx < dy}
  {P < 0}
  $P_k = -3 + 2(3)$
  $= 3$
  PerubahX = -1(-1)
  $= 1$
  $x_k = -4 + (-1) + i \Rightarrow -4$
  $y_k = -2 + 1 + 0 \Rightarrow -1$
  Gambar (-4,-1)
- i = 2 {dx < dy}
  {P_k > 0}
  $P_k = 3 + 2(3-9)$
  $= 3 + (-12)$
  $= -9$
  PerubahX = 0
  $x_k = -4 + (-1) + 0 \Rightarrow -5$
  $y_k = -1 + 1 + 0 \Rightarrow 0$
  Gambar (-5,0)
- i = 3 {dx < dy}
  {P_k < 0}
  $P_k = -9 + 2(3)$
  $= -3$
  PerubahX = -1(-1)
  $= 1$
  $x_k = -5 + (-1) + 1 \Rightarrow -5$
  $y_k = 0 + (1) + 0 \Rightarrow 1$
  Gambar(-5,1)
- i = 4 {dx < dy}
  {P_k < 0}
  $P_k = 3$
  PerubahX = 1
  $x_k = -5 + (-1) + 1 \Rightarrow -5$
  $y_k = 1 + 1 + 0 \Rightarrow 2$
  Gambar (-5,2)
- i = 5 {dx < dy}
  {P_k > 0}
  $P_k = -9$
  PerubahX = 0
  $x_k = -5 + (-1) + 0 \Rightarrow -6$
  $y_k = 2 + 1 + 0 \Rightarrow 3$
  Gambar (-6,3)
- i = 6 {dx < dy}
  {P_k < 0}
  $P_k = -3$
  PerubahX = 1
  $x_k = -5 + (-1) + 1 \Rightarrow -6$
  $y_k = 3 + 1 + 0 \Rightarrow 4$
  Gambar (-6,4)
- i = 7 {dx < dy}
  {P_k < 0}
  $P_k = 3$
  PerubahX = 1
  $x_k = -6 + (-1) + 1 \Rightarrow -6$
  $y_k = 4 + 1 + 0 \Rightarrow 5$
  Gambar (-6,5)
- i = 8 {dx < dy}
  {P_k > 0}
  $P_k = -9$
  PerubahX = 0
  $x_k = -6 + (-1) + 0 \Rightarrow -7$
  $y_k = 5 + 1 + 0 \Rightarrow 6$
  Gambar (-7,6)
- i = 9 {dx < dy}
  {P_k < 0}
  $P_k = -3$
  PerubahX = 1
  $x_k = -7 + (-1) + 1 \Rightarrow -7$
  $y_k = 6 + 1 + 0 \Rightarrow 7$
  Gambar (-7,7)

Perulangan selesai
(step = 9)



3. Lingkaran P(6,3) ← pusat, dilewat melalui titik A(9,7)

*sebutkan minimal 12 buah titik lainnya.

a. cari r

$$r = \sqrt{(x-x_c)^2 + (y-y_c)^2}$$
$$= \sqrt{(9-6)^2 + (7-3)^2}$$
$$= \sqrt{3^2 + 4^2}$$
$$= 5$$

b. cari titik" lingkaran "MID POINT"

1) titik awal $(x,y) = (0,r)$
$= (0,5)$

$P_0 = 1 - r$
$= -4$

Putpixel P(0,0) = (0,5) (0,-5) (5,0) (-5,0)
Putpixel P(6,3) = (6,8) (6,-2) (11,3) (1,3)

2) perulangan utk K=1 s/d $x \geq y$

- K=1 {P<0}
  - x = x+1 => 1
  - y = y --> 5
  - P = -4 + 2(1) + 1
    = -1
  - Putpixel P(0,0) = (1,5) (1,-5) (-1,5) (-1,-5) (5,1) (5,-1) (-5,1) (-5,-1)
    P(6,3) = (7,8) (7,-2) (5,8) (5,-2) (11,4) (11,2) (1,4) (1,2)

- K=2 {P<0}
  - x = 2
  - y = 5
  - P = (-1) + 2(2) + 1
    = 4
  - Putpixel P(0,0) = (2,5) (2,-5) (-2,5) (-2,-5) (5,2) (5,-2) (-5,2) (-5,-2)
    P(6,3) = (8,8) (8,-2) (4,8) (4,-2) (11,5) (11,1) (1,5) (1,1)

- K=3 {P>0}
  - x = x+1 => 3
  - y = y-1 => 4
  - P = 4 + 2(3-4) + 1
    = 3
  - Putpixel P(0,0) = (3,4) (3,-4) (-3,4) (-3,-4)
    (4,3) (4,-3) (-4,3) (-4,-3)
    P(6,3) = (9,7) (9,-1) (3,7) (3,-1)
    (10,6) (10,0) (2,6) (2,0)

- K=4 {P>0}
  - x = 4
  - y = 3

y x > y --> perulangan berhenti.

5. Viewport dg kartesius titik sudut (2,5) dan (19,16)
garis PQ dg titik ujung P (1,3) dan Q (16,18)

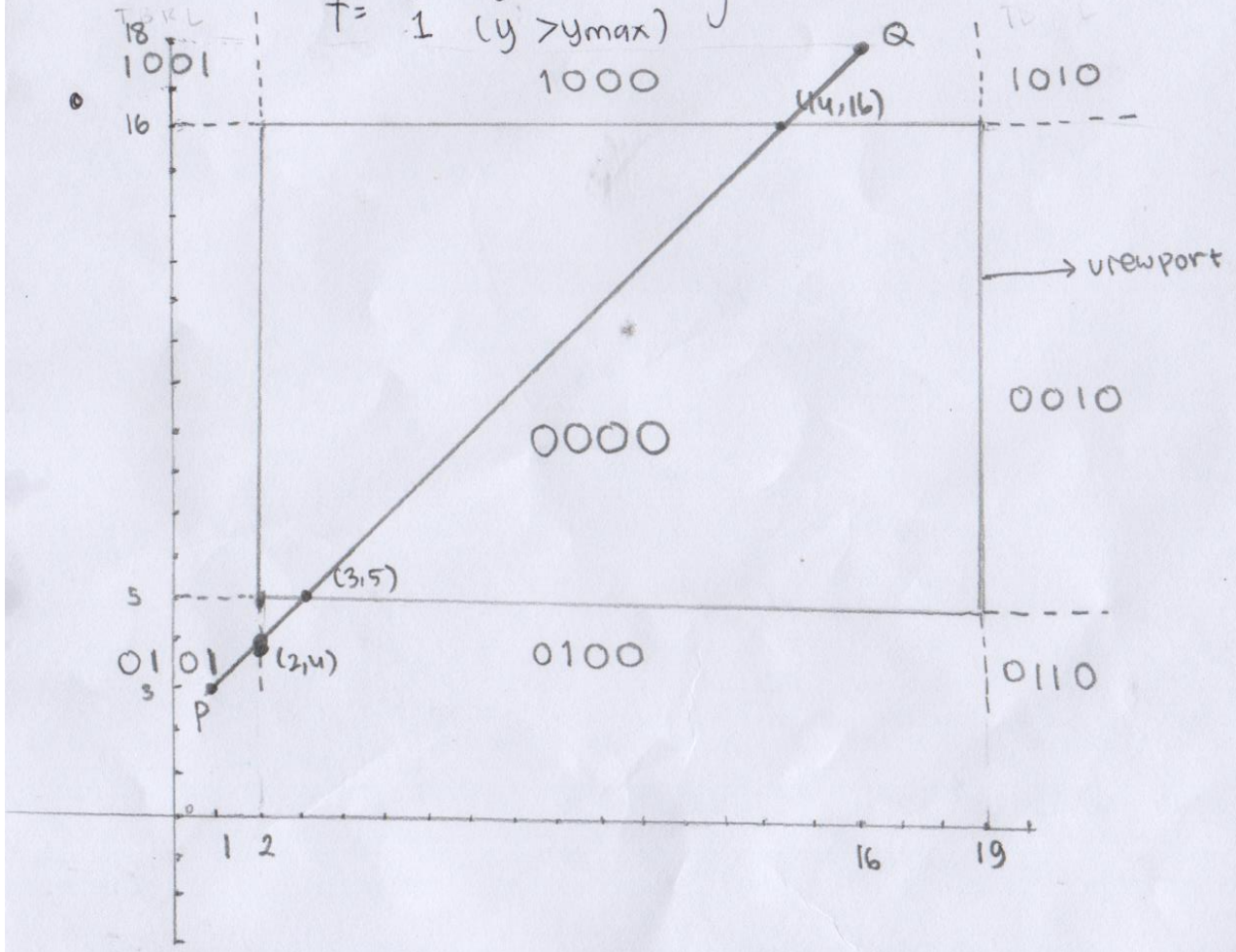
Penyelesaian:

- viewport: $x_{min} = 2$; $x_{max} = 19$
  $y_{min} = 5$; $y_{max} = 16$

- menentukan region code ujung P & Q

P (1,3): L = 1 ($x < x_{min}$)
R = 0 ($x < x_{max}$)
B = 1 ($y < y_{min}$)
T = 0 ($y < y_{max}$)
} reg. code 0101

Q (16,18): L = 0 ($x > x_{min}$)
R = 0 ($x < x_{max}$)
B = 0 ($y > y_{min}$)
T = 1 ($y > y_{max}$)
} reg. code 1000



Karena ujung P dan ujung Q berada diluar viewport maka garis PQ perlu dipotong.

- menentukan titik potong

P(1,3) : L = 1 → ttPotong (xmin, yp1)

- $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{18-3}{16-1} = \frac{15}{15} = 1$
- $y_{p1} = y_1 + m * (x_{min} - x_1)$
  $= 3 + 1(2-1)$
  $= 4$

→ ttPotong (2,4) ----- region code : 0100

L = 0 (x = xmin)
R = 0 (x < xmax)
B = 1 (y < ymin)
T = 0 (y < ymax)

B = 1 → ttPotong (xp1, ymin)

- $x_{p1} = x_1 + \frac{y_{min} - y_1}{m}$
  $= 1 + (5-3)$
  $= 3$

→ ttPotong (3,5) --- reg. code : 0000

L = 0 (x > xmin)
R = 0 (x < xmax)
B = 0 (y = ymin)
T = 0 (y < ymax)

Q(16,18) : T = 1 → ttPotong (xp2, ymax)

- $x_{p2} = x_1 + \frac{y_{max} - y_1}{m}$
  $= 16 + (16-18)$
  $= 16 - 2$
  $= 14$

----→ ttPotong (14,16) ---- reg. code : 0000

L = 0 (x > xmin)
R = 0 (x < xmax)
B = 0 (y > ymin)
T = 0 (y = ymax)

Titik potong yang digunakan adalah yang berada dalam viewport / yang memiliki region code = 0000, sehingga titik potong garis PQ adalah : (3,5) dan (14,16)