

①

الف) $\left| \begin{matrix} x & y \\ 2 & -1 \end{matrix} \right| = 0$ $m = \frac{2 - (-1)}{-1 - 2} = -1$

$y - y_A = m(x - x_A) \rightarrow -1(x - 2) = y - 1$

$\rightarrow y = -x + 3$

ب) $2x + 3y = -1 \rightarrow m = \frac{-2}{3} = -\frac{2}{3}$

$-2(x - 2) = y - 1 \rightarrow -2x + 4 = y - 1$

ج) $x + 3y = 1$ $m = -\frac{1}{3} \rightarrow m_{AH} = 3$

A $\left| \begin{matrix} x & y \\ 2 & -1 \end{matrix} \right| = 0$ $3(x - 2) = y - 1 \rightarrow y = 3x - 5$

د) $\tan \frac{\pi}{4} = \sqrt{3}$ $y = \sqrt{3}x + b$ $\left| \begin{matrix} x & y \\ 2 & -1 \end{matrix} \right| = 0$ $2 = \sqrt{3}(2) + b$

$\Rightarrow b = 2 - 2\sqrt{3}$

$y = \sqrt{3}x + 2 - 2\sqrt{3}$

②

الف) $\sqrt{(x - x_A)^2 + (y - y_A)^2} = \sqrt{(2 + 1)^2 + (3 - 1)^2}$

$= \sqrt{1 + 4} = \sqrt{5}$

ب) $3x + 4y = 3 \rightarrow \frac{|3(2) + 4(3) - 3|}{\sqrt{3^2 + 4^2}} = \frac{15}{5} = 3$

$x + 4y = 1$ $2x + 3y = 5$ $5x + 4y = 12$

③

الف) $5x + 4y = \frac{1 + 12}{5} = 5 \rightarrow 5x + 4y = 5$

ب) $d = \frac{|1(2) - 1|}{\sqrt{1^2 + 4^2}} = \frac{|2 - 1|}{\sqrt{17}} = \frac{1}{\sqrt{17}} = \frac{\sqrt{17}}{17}$

$$rx - ry = 1 \quad rx + ry = r$$

(5)

$$\frac{|rx - ry - 1|}{\sqrt{r^2 + r^2}} = \frac{|rx + ry - r|}{\sqrt{r^2 + r^2}}$$

$$rx - ry - 1 = rx + ry - r \Rightarrow x - y = -r$$

$$rx - ry - 1 = -rx - ry + r \Rightarrow x + y = r$$

$$y + rx = r \rightarrow m = -r$$

(a)

$$y - rx = a \rightarrow m' = r$$

$$\tan \alpha = \left| \frac{m - m'}{1 + mm'} \right|$$

$$\Rightarrow \tan \alpha = 1 \quad \alpha = 45^\circ$$

$$= \left| \frac{r - (-r)}{1 - r^2} \right| = 1$$

$$A \left| \begin{matrix} r \\ -r \end{matrix} \right| \quad B \left| \begin{matrix} -a \\ r \end{matrix} \right|$$

(9)

$$i) d = \sqrt{(x_B - x_A)^2 + (y_B - y_A)^2} = \sqrt{r^2 + (-1)^2} = \sqrt{r^2 + 1} = 10$$

$$ii) x = \frac{x_B + x_A}{r} \Rightarrow \frac{r - a}{r} = -1$$

$$y = \frac{y_B + y_A}{r} \Rightarrow \frac{r - r}{r} = 1$$

(V)

$$iii) x = \frac{x_A + x_B + x_C}{r} = \frac{-10 - r + r}{r} = -1$$

$$y = \frac{y_A + y_B + y_C}{r} = \frac{-1r + r + 1}{r} = -\frac{r}{r} = -1$$

$$iv) \frac{1}{r} \begin{vmatrix} r & 1 & 1 \\ -r & r & 1 \\ -10 & -1r & 1 \end{vmatrix} = \frac{r + r^2 - 10 + r^2 + r^2 + r}{r}$$

$$= \frac{r^2}{r} = r$$

$$y = \frac{r_n + 1}{r_n - r}$$

الف) $-y = \frac{r_n + 1}{r_n - r} \Rightarrow y = \frac{-r_n - 1}{-r_n + r}$ (معكوس)

ب) $\frac{1}{y} = \frac{-r_n + 1}{-r_n - r} \Rightarrow y = \frac{-r_n + 1}{-r_n - r}$ (معكوس)

ج) $y = n \Rightarrow y = \frac{r_n + 1}{r_n - r}$

د) $-y = \frac{-r_n + 1}{-r_n - r} \Rightarrow y = \frac{r_n - 1}{r_n + r} \Rightarrow y = \frac{-r_n - 1}{r_n - r}$

الف) $\begin{cases} n' = n - r \\ \Rightarrow n = n' + r \end{cases} \quad y = \frac{r_n + 1}{n - r} \quad (9)$

$y' = y + r \Rightarrow y = y' - r$

$$y' - r = \frac{r(n' + r) + 1}{n' - 1} = \frac{rn' + r^2 + 1}{n' - 1}$$

$$\Rightarrow \frac{rn' + r^2 + rn' - r}{n' - 1} = \frac{2rn' + r^2 - r}{n' - 1}$$

ب) $\begin{cases} n' = n - r \Rightarrow n = n' + r \\ y' = y - r \Rightarrow y = y' + r \end{cases}$

$$y' + r = \frac{r(n' + r) + 1}{n' + r - r} = \frac{rn' + r^2 + 1}{n'}$$

$$\frac{rn' + r^2 + 1 - rn'}{n'} = \frac{r^2 + 1}{n'}$$

$$\text{ii)} \begin{cases} rx + ry = r \\ x(2 - ay = 1) \end{cases} \begin{cases} rx + ry = r \\ -rx + 1ay - r \\ 19y = -1 \\ y = \frac{-1}{19} \rightarrow x = \frac{1r}{19} \end{cases} \quad (b)$$

$$\rightarrow \begin{cases} rx + ry = r \\ x - ay = 1 \end{cases}$$

$$x = - \frac{r + 10}{-10 - 1r} = \frac{1r}{19}$$

$$y = \frac{r - r}{-10 - r} = \frac{+1}{-19}$$