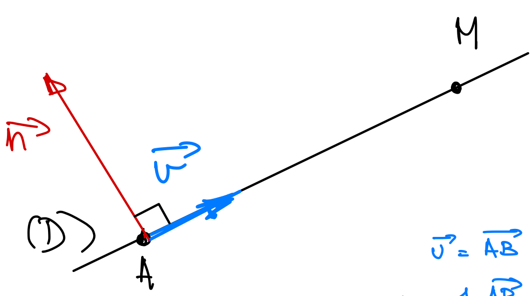
$$\vec{n} \perp \overrightarrow{AM}$$

$\vec{n} = (a, b)$



$M(x, y)$

$\vec{u} = \overrightarrow{AB}$

ou $\frac{1}{2}\overrightarrow{AB}$

ou $-151273{,}1\ \overrightarrow{AB}$

$A = (2,3)$, $B = (-1,4)$.

$\vec{v} = \overrightarrow{AB} = (x_B - x_A, y_B - y_A) = (-1-2, 4-3) = (-3,1)$

pente $= \frac{1}{-3} = -1/3$.

<u>équation paramétrique</u> : $(A, \vec{v}) \longleftarrow (D)$

$M \in (D) \iff$ il existe $t \in \mathbb{R}$, tq. $\overrightarrow{AM} = t\vec{v}$

$\overrightarrow{AM} = (x-2, y-3)$ $\vec{v} = (-3,1)$

$\overrightarrow{AM} = t\vec{v} \iff (x-2, y-3) = t(-3,1) = (-3t, t)$

$\iff \begin{cases} x-2 = -3t \\ y-3 = t \end{cases} \iff \boxed{\begin{cases} x = -3t+2 \\ y = t+3 \end{cases}, t \in \mathbb{R}}$

<u>équation cartésienne</u> $(ax+by+c=0)$

- $y = t+3 \longrightarrow t = y-3$
  $x-2 = -3t \longrightarrow x-2 = -3(y-3)$
  $\iff \boxed{x+3y-11=0}$

$\overrightarrow{OA} = (x_0, y_0)$
$\Updownarrow$
$A = (x_0, y_0) \in (D)$

- autre méthode.

(D) : $ax+by+c = 0$

$A \in (D) \iff ax_0 + by_0 + c = 0 \iff ax_0 + by_0 = -c$

$ax+by+c=0 \iff ax+by=-c$

$\overrightarrow{OM}=(x,y)$ $\quad\quad$ $\overrightarrow{OA}=(x_0,y_0)$

$\Updownarrow$ $\quad\quad$ $\Updownarrow$

$M=(x,y)$ $\quad\quad$ $A=(x_0,y_0)$

$$\boxed{M\in(D) \iff \underbrace{\vec{n}\cdot\overrightarrow{OM}}_{ax+by}=\underbrace{\vec{n}\cdot\overrightarrow{OA}}_{ax_0+by_0=-c}}$$ avec $\vec{n}=(a,b)$

$ax+by=-c \iff ax+by+c=0$

$\iff M\in(D)$

$M\in(D) \iff \vec{n}\cdot(\underbrace{\overrightarrow{OM}-\overrightarrow{OA}}_{\overrightarrow{AM}})=0 \iff \vec{n}\cdot\overrightarrow{AM}=0$

$\iff \vec{n}\perp\overrightarrow{AM}$

$\vec{v}=(-3,1)$ $\quad\quad$ $\vec{n}\cdot\vec{v}=0$

$\vec{n}=(1,3)$

$1.x+3.y=c \iff x+3y=c$

$A=(2,3)\in(D)$ donc

$c=x_A+3y_A=2+3\times3=11$

$x + 3y + c = 0 \longrightarrow \boxed{x + 3y - 11 = 0}$

2.a $A = (2,1)$ $\quad \vec{v} = (-3,-1)$

<u>équation paramétrique</u> $\quad M = (x,y) \in (D) \iff \boxed{\exists t \in \mathbb{R},\ \overrightarrow{AM} = t\vec{v}}$

il existe

$\overrightarrow{AM} = (x-2, y-1) \qquad t\vec{v} = (-3t, -t)$

$$\boxed{\begin{cases} x - 2 = -3t \\ y - 1 = -t \end{cases},\ t \in \mathbb{R}}$$

<u>équation cartésienne</u> $\quad \vec{n} = (1,-3) \qquad \boxed{\vec{n} \cdot \vec{v} = 0}$

$1 \times x - 3 \times y = \ ? = x_A - 3y_A$

$2 - 3 \times 1 = -1$

$$\boxed{x - 3y + 1 = 0}$$

<u>vérification</u> On substitue t dans l'équation paramétrique.

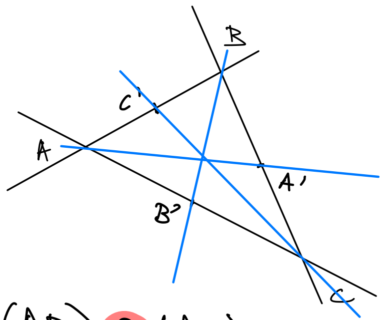
$y - 1 = -t \longrightarrow t = -y + 1$

$x - 2 = -3t \longrightarrow x - 2 = -3(-y+1) . \quad 3y - 3$

$x - 2 = 3y - 3 \iff \boxed{x - 3y + 1 = 0}$

Exercice 2 ABC

(AB) : $x + 2y = 3$ (AC) : $x+y=2$ (BC) $2x+3y=4$



$$x_{A'} = \frac{x_B + x_C}{2} \qquad y_{A'} = \frac{y_B + y_C}{2}$$

(a) : $A = (AB) \cap (AC)$ $A \in (AB)$ et $A \in (AC)$

$A = (x, y)$:
$$\begin{cases} x + 2y = 3 & (AB) \\ \text{et} \\ x + y = 2 & (AC) \end{cases} \iff \begin{cases} x = 1 \\ y = 1 \end{cases}$$

$A = (1, 1)$

$B = (-1, 2)$
$$\begin{cases} x + 2y = 3 & (AB) \\ 2x + 3y = 4 & (BC) \end{cases}$$

$x + 2y = 3 \longrightarrow x = -2y + 3$

$2x + 3y = 4 \longrightarrow 2(-2y+3) + 3y = 4$

$\iff -y + 2 = 0 \iff y = 2$

$x = -2y + 3 = -2 \times 2 + 3 = -1$

$C = (2, 0)$
$$\begin{cases} x+y=2 & (AC) \longrightarrow y = -x+2 \xrightarrow{x=2} y = 0 \\ 2x+3y=4 & (BC) \longrightarrow 2x+3(-x+2) = 4 \end{cases}$$

$-x + 6 = 4 \longrightarrow x = 2$

$A = (1,1)$, $B = (-1,2)$, $C = (2,0)$

$A' = (\frac{1}{2}, 1)$, $B' = (\frac{3}{2}, \frac{1}{2})$, $C' = (0, 3/2)$

Equations de (AA'), (BB'), (CC')

(AA') $\vec{v} = \overrightarrow{AA'} = (-\frac{1}{2}, 0)$ $\vec{n} = (0, 1)$ $\vec{n}\cdot\vec{v} = 0$

$0.x + 1.y = \vec{n}\cdot(\overrightarrow{OA}) = \underbrace{(0,1)\cdot(1,1)}_{1} \rightarrow \boxed{y = 1}$

(BB') $\vec{v} = \overrightarrow{BB'} = (\frac{5}{2}, -\frac{3}{2})$ $\vec{n} = (3, 5)$ $(\vec{n}\cdot\overrightarrow{OB}) = 3\times(-1) + 5\times 2$

$\boxed{3x + 5y = 7}$

(CC') $\vec{v} = \overrightarrow{CC'} = (-2, 3/2)$ $\vec{n} = (\frac{3}{2}, 2)$ $\vec{n}\cdot\overrightarrow{OC} = 3$

$\boxed{\frac{3}{2}x + 2y = 3}$

$$\left\{\begin{array}{l} y = 1 \\ 3x + 5y = 7 \\ \frac{3}{2}x + 2y = 3 \end{array}\right. \longrightarrow \begin{array}{l} y = 1 \\ 3x + 5 = 7 \Leftrightarrow 3x = 2 \Leftrightarrow x = 2/3 \end{array}$$

$\overset{?}{\in} (CC')$

$(AA') \cap (BB') = \{(\frac{2}{3}, 1)\}$

$\frac{3}{2}\cdot\frac{2}{3} + 2\times 1 = 3$