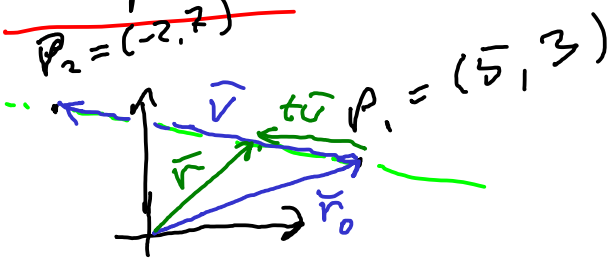
Rep L 4

$P_2 = (-2, 7)$



Vektorform

$$\bar{r}_0 = \begin{bmatrix} 5 \\ 3 \end{bmatrix} \qquad \bar{v} = \begin{bmatrix} -2-5 \\ 7-3 \end{bmatrix} = \begin{bmatrix} -7 \\ 4 \end{bmatrix}$$

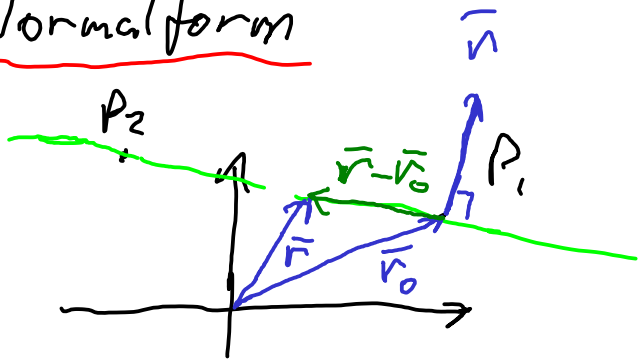
$$\bar{r} = \begin{bmatrix} x \\ y \end{bmatrix}$$

$$\bar{r} = \bar{r}_0 + t \cdot \bar{v}$$

$$\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 3 \end{bmatrix} + t \begin{bmatrix} -7 \\ 4 \end{bmatrix} \qquad -\infty < t < \infty$$

$$\begin{cases} x = 5 + t(-7) \\ y = 3 + t\,4 \end{cases}$$

Normalform



$$\bar{v} = \begin{bmatrix} -7 \\ 4 \end{bmatrix}$$

$$\bar{r} = \begin{bmatrix} x \\ y \end{bmatrix}$$

$$\bar{r}_0 = \begin{bmatrix} 5 \\ 3 \end{bmatrix} \qquad \bar{n} = \begin{bmatrix} 4 \\ 7 \end{bmatrix}$$

$$\bar{n} \bullet (\bar{r} - \bar{r}_0) = 0$$

$$\begin{bmatrix} 4 \\ 7 \end{bmatrix} \bullet \left(\begin{bmatrix} x \\ y \end{bmatrix} - \begin{bmatrix} 5 \\ 3 \end{bmatrix} \right) = 0$$

$$\begin{bmatrix} 4 \\ 7 \end{bmatrix} \bullet \begin{bmatrix} x-5 \\ y-3 \end{bmatrix} = 0$$

$$4(x-5) + 7(y-3) = 0$$

$$4x - 20 + 7y - 21 = 0$$

$$4x + 7y - 41 = 0$$

Linjens ekv.

Från normalform $7y = -4x + 41$

$$\boxed{y = -\frac{4}{7}x + \frac{41}{7}}$$

Från parameterform ~~$t =$~~ $\frac{x-5}{-7} = \frac{y-3}{4}$

$$-\frac{4}{7}x + \frac{5 \cdot 4}{7} = y - 3$$

$$-\frac{4}{7}x + \frac{20}{7} + 3 = y$$

$$\boxed{y = -\frac{4}{7}x + \frac{41}{7}}$$

Planets ekvation

$$\bar{n} = \begin{bmatrix} A \\ B \\ C \end{bmatrix} \qquad \bar{r}_0 = \begin{bmatrix} x_0 \\ y_0 \\ z_0 \end{bmatrix} \qquad \bar{r} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

$$\bar{n} \cdot (\bar{r} - \bar{r}_0) = 0$$

$$\begin{bmatrix} A \\ B \\ C \end{bmatrix} \cdot \begin{bmatrix} x - x_0 \\ y - y_0 \\ z - z_0 \end{bmatrix} = 0$$

$$A(x-x_0)+B(y-y_0)+C(z-z_0)=0$$

Ex: $P_0 = (-1, 2, 1)$

$R = (0, 6, 3)$

$Q = (1, 1, 4)$

$$\overline{P_0R} = \begin{bmatrix} 0-(-1) \\ 6-2 \\ 3-1 \end{bmatrix} = \begin{bmatrix} 1 \\ 4 \\ 2 \end{bmatrix}$$

$$\overline{P_0Q} = \begin{bmatrix} 1-(-1) \\ 1-2 \\ 4-1 \end{bmatrix} = \begin{bmatrix} 2 \\ -1 \\ 3 \end{bmatrix}$$

$$\vec{n} = \overline{P_0R} \times \overline{P_0Q}$$

$$= \begin{bmatrix} 1 \\ 4 \\ 2 \end{bmatrix} \times \begin{bmatrix} 2 \\ -1 \\ 3 \end{bmatrix} = \begin{bmatrix} 4\cdot 3 - 2(-1) \\ -(1\cdot 3 - 2\cdot 2) \\ 1(-1) - 4\cdot 2 \end{bmatrix} = \begin{bmatrix} 14 \\ 1 \\ -9 \end{bmatrix}$$

i Planets eleu.

$$14(x-(-1)) + 1\cdot(y-2) + (-9)(z-1) = 0$$

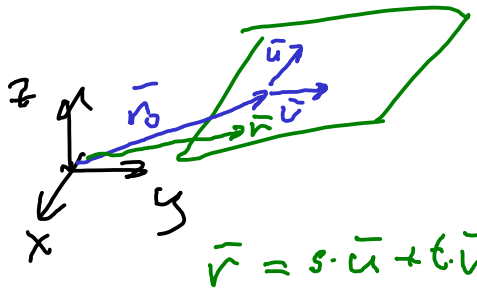
$$14x + 14 + y - 2 - 9z + 9 = 0$$

$$\boxed{14x + y - 9z + 21 = 0}$$

Parameterform

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -1 \\ 2 \\ 1 \end{bmatrix} + s\cdot\begin{bmatrix} 1 \\ 4 \\ 2 \end{bmatrix} + t\begin{bmatrix} 2 \\ -1 \\ 3 \end{bmatrix}$$

$-\infty < s < \infty \quad -\infty < t < \infty$



$\vec{r} = s\cdot\vec{u} + t\cdot\vec{v} + \vec{v_0}$

$s,t \in \mathbb{R}$

Ex: $x+y+z=1$ | $x-y=0$

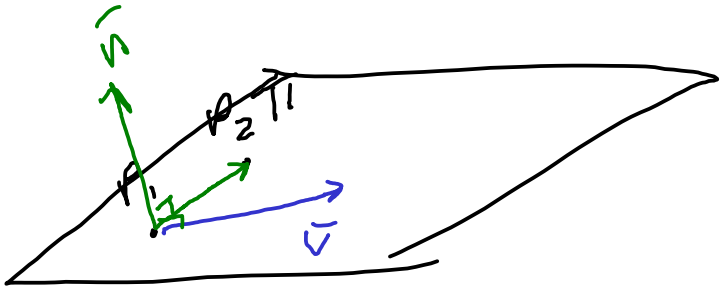
$$\bar{n}_1=\begin{bmatrix}1\\1\\1\end{bmatrix} \qquad \bar{n}_2=\begin{bmatrix}1\\-1\\0\end{bmatrix}$$

Riktningsvektor för skärningslinjen

$$\bar{v}=\bar{n}_1\times\bar{n}_2=\begin{bmatrix}1\\1\\1\end{bmatrix}\times\begin{bmatrix}1\\-1\\0\end{bmatrix}=\begin{bmatrix}1\cdot 0-1\cdot(-1)\\-(1\cdot 0-1\cdot 1)\\1(-1)-1\cdot 1\end{bmatrix}$$

$$=\begin{bmatrix}1\\1\\-2\end{bmatrix}$$

Exempel



$P_1=(0,-3,1) \qquad P_2=(1,-1,1)$

$$\overline{P_1P_2}=\begin{bmatrix}1-0\\-1-(-3)\\1-1\end{bmatrix}=\begin{bmatrix}1\\2\\0\end{bmatrix} \qquad \bar{v}=\begin{bmatrix}0\\2\\2\end{bmatrix}$$

$$\bar{n}=\overline{P_1P_2}\times\bar{v}=\begin{bmatrix}1\\2\\0\end{bmatrix}\times\begin{bmatrix}0\\2\\2\end{bmatrix}=\begin{bmatrix}2\cdot 2-2\cdot 0\\-(1\cdot 2-0\cdot 0)\\1\cdot 2-2\cdot 0\end{bmatrix}=\begin{bmatrix}4\\-2\\2\end{bmatrix}$$

i planets ekv. gen

$$4(x-0)+(-2)(y-(-3))+2(z-1)=0$$

$$4x-2y-6+2z-2=0$$

$$\boxed{4x-2y+2z-8=0}$$