

Problema

Determineu les interseccions de la recta que passa pels punts $M(-6, 6, -5)$, $N(12, -6, 1)$ i els plànols coordenats

Solució:

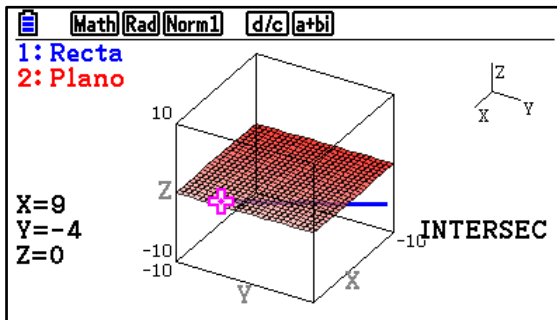
Obrim el *Menú Gráfico 3D*

Definim la recta que passa pels punts $M(-6, 6, -5)$, $N(12, -6, 1)$

Definim el plànol $z = 0$

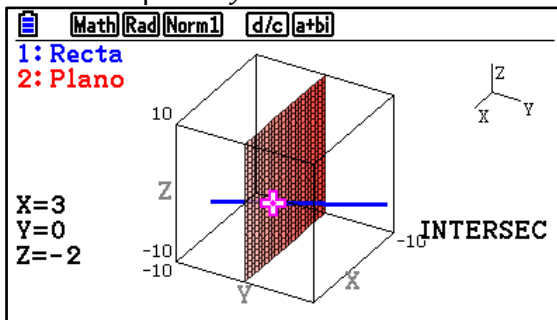
Amb la funció *G-Solv* determinem la intersecció.

<p>Math Rad Norm1 d/c a+bi</p> <p>Recta pasa por 2 puntos</p> <table border="1"><thead><tr><th></th><th>X</th><th>Y</th><th>Z</th></tr></thead><tbody><tr><td>P1</td><td>-6</td><td>6</td><td>-5</td></tr><tr><td>P2</td><td>12</td><td>-6</td><td>1</td></tr></tbody></table> <p>1</p> <p>EXPRESS VECTOR P&V POINTS EDIT SET</p>		X	Y	Z	P1	-6	6	-5	P2	12	-6	1	<p>Math Rad Norm1 d/c a+bi</p> <p>Gráfico 3D</p> <p>1 Recta [—]</p> <p>P1=(-6 , 6 , -5)</p> <p>P2=(12 , -6 , 1)</p> <p>2 Plano [—]</p> <p>0 X+ 0 Y</p> <p>+ 1 Z+ 0 = 0</p> <p>SELECT DELETE TYPE 3D-GMEM DRAW</p>
	X	Y	Z										
P1	-6	6	-5										
P2	12	-6	1										



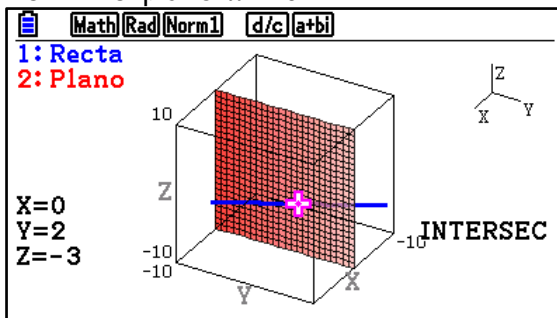
El punt intersecció té coordenades $P(9, -4, 0)$

Definim el plànol $y = 0$



El punt intersecció té coordenades $Q(3, 0, 2)$

Definim el plànol $x = 0$



El punt intersecció té coordenades $R(0, 2, -3)$

Solució analítica:

Determinem l'equació general de la recta que passa pels punts

$$M(-6, 6, -5), N(12, -6, 1)$$

$$\overrightarrow{MN} = (18, -12, 6)$$

L'equació contínua de la recta és:

$$\frac{x+6}{3} = \frac{y-6}{-2} = \frac{z+5}{1}$$

L'equació general de la recta és:

$$\begin{cases} 2x + 3y = 6 \\ y + 2z = -4 \end{cases}$$

Per calcular la intersecció de la recta i els plànols coordenats, resoldrem els tres sistemes que formen les equacions de la recta i cadascun dels plànol coordenats.

$$\begin{cases} 2x + 3y = 6 \\ y + 2z = -4 \\ z = 0 \end{cases}, \begin{cases} 2x + 3y = 6 \\ y + 2z = -4 \\ y = 0 \end{cases}, \begin{cases} 2x + 3y = 6 \\ y + 2z = -4 \\ x = 0 \end{cases}$$

Obrim el *Menú Ecuación*:

<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black; margin-bottom: 5px;"> Math Rad Norm1 d/c a+bi </div> <p style="margin: 0;">$a_n X + b_n Y + C_n Z = d_n$</p> <table style="width: 100%; border-collapse: collapse; margin: 5px 0;"> <thead> <tr> <th style="width: 5%;"></th> <th style="width: 20%; border-bottom: 1px solid black;">a</th> <th style="width: 20%; border-bottom: 1px solid black;">b</th> <th style="width: 20%; border-bottom: 1px solid black;">c</th> <th style="width: 20%; border-bottom: 1px solid black;">d</th> </tr> </thead> <tbody> <tr> <td style="text-align: right;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">0</td> <td style="text-align: center;">6</td> </tr> <tr> <td style="text-align: right;">2</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">-4</td> </tr> <tr> <td style="text-align: right;">3</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> </tr> </tbody> </table> <div style="text-align: right; margin-top: 5px;">0</div> <div style="display: flex; justify-content: space-between; border-top: 1px solid black; margin-top: 5px;"> SOLVE DELETE CLEAR EDIT </div> </div>		a	b	c	d	1	2	3	0	6	2	0	1	2	-4	3	0	0	1	0	<div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid black; margin-bottom: 5px;"> Math Rad Norm1 d/c a+bi </div> <p style="margin: 0;">$a_n X + b_n Y + C_n Z = d_n$</p> <table style="width: 100%; border-collapse: collapse; margin: 5px 0;"> <tr> <td style="width: 5%;"></td> <td style="width: 20%; border-bottom: 1px solid black;">X</td> <td style="width: 20%; border-bottom: 1px solid black;">9</td> </tr> <tr> <td></td> <td style="border-bottom: 1px solid black;">Y</td> <td style="border-bottom: 1px solid black;">-4</td> </tr> <tr> <td></td> <td style="border-bottom: 1px solid black;">Z</td> <td style="border-bottom: 1px solid black;">0</td> </tr> </table> <div style="text-align: right; margin-top: 5px;">9</div> <div style="display: flex; justify-content: space-between; border-top: 1px solid black; margin-top: 5px;"> REPEAT </div> </div>		X	9		Y	-4		Z	0
	a	b	c	d																										
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El punt intersecció té coordenades $P(9, -4, 0)$

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El punt intersecció té coordenades $Q(3, 0, 2)$

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El punt intersecció té coordenades $R(0, 2, -3)$