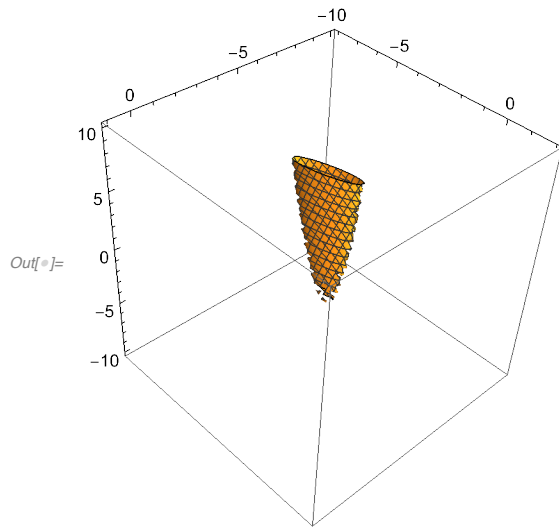


In[*]:= ContourPlot3D[

[representación 3D de contornos](#)

$$3x^2 + 4y^2 + 21z^2 + 6xy + 12xz + 18yz - 12x - 14y - 29z + 14 = 0,$$

$$\{x, -8, 2\}, \{y, -10, 10\}, \{z, -10, 1\}]$$



In[*]:=

$$mm := \begin{pmatrix} 14 & -6 & -7 & -29/2 \\ -6 & 3 & 3 & 6 \\ -7 & 3 & 4 & 9 \\ -29/2 & 6 & 9 & 21 \end{pmatrix}$$

$$m := \begin{pmatrix} 3 & 3 & 6 \\ 3 & 4 & 9 \\ 6 & 9 & 21 \end{pmatrix}$$

CharacteristicPolynomial[mm, x]

[polinomio característico](#)

CharacteristicPolynomial[m, x]

[polinomio característico](#)

Eigenvalues[m]

[autovalores](#)

Eigenvectors[m]

[autovectores](#)

$$Out[*] = -\frac{3}{4} - \frac{149x}{4} + \frac{519x^2}{4} - 42x^3 + x^4$$

$$Out[*] = -33x + 28x^2 - x^3$$

$$Out[*] = \{14 + \sqrt{163}, 14 - \sqrt{163}, 0\}$$

$$Out[*] = \left\{ \left\{ -\frac{4 - \sqrt{163}}{29 + 2\sqrt{163}}, -\frac{11 - \sqrt{163}}{29 + 2\sqrt{163}}, 1 \right\}, \left\{ -\frac{4 - \sqrt{163}}{-29 + 2\sqrt{163}}, -\frac{11 - \sqrt{163}}{-29 + 2\sqrt{163}}, 1 \right\}, \{1, -3, 1\} \right\}$$

Paraboloide elíptico

In[*]:=

$$\text{Solve}[-\{14 + \sqrt{163}, 14 - \sqrt{163}, 0\} \cdot \{14 + \sqrt{163}, 14 - \sqrt{163}, 0\} a^2 = -3/4, a]$$

[resuelve](#)

$$\left\{ \left\{ a \rightarrow -\frac{\sqrt{\frac{3}{718}}}{2} \right\}, \left\{ a \rightarrow \frac{\sqrt{\frac{3}{718}}}{2} \right\} \right\}$$

In[]:=

$$\text{Solve}\left[\left\{\left\{0, -\frac{-4 - \sqrt{163}}{29 + 2\sqrt{163}}, -\frac{-11 - \sqrt{163}}{29 + 2\sqrt{163}}, 1\right\}.\text{mm}.\{1, x, y, z\} = 0,\right.\right.$$

[\[resuelve\]](#)

$$\left\{0, -\frac{4 - \sqrt{163}}{-29 + 2\sqrt{163}}, -\frac{11 - \sqrt{163}}{-29 + 2\sqrt{163}}, 1\right\}.\text{mm}.\{1, x, y, z\} = 0, 3x^2 + 4y^2 +$$

$$21z^2 + 6xy + 12xz + 18yz - 12x - 14y - 29z + 14 = 0\}, \{x, y, z\}]$$

$$\left\{ \left\{ x \rightarrow \frac{79}{484}, y \rightarrow \frac{1897}{484}, z \rightarrow -\frac{1501}{1452} \right\} \right\}$$

Ecuación Reducida $\sqrt{\frac{3}{718}} z =$

$$(14 + \sqrt{163}) x^2 + (14 - \sqrt{163}) y^2$$

$$\left\{ \left(\frac{79}{484}, \frac{1897}{484}, -\frac{1501}{1452} \right), \right.$$

$$\text{Normalizar} \left\{ \left\{ -\frac{-4 - \sqrt{163}}{29 + 2\sqrt{163}}, -\frac{-11 - \sqrt{163}}{29 + 2\sqrt{163}}, 1 \right\}, \right.$$

$$\left\{ -\frac{4 - \sqrt{163}}{-29 + 2\sqrt{163}}, -\frac{11 - \sqrt{163}}{-29 + 2\sqrt{163}}, 1 \right\}, \{1, -3, 1\} \right\}$$

$$\text{ContourPlot3D}[x^2 + 4y^2 + z^2 - 4xz + 2xz - 4yz + 2x - 3y + 4 = 0,$$

[\[representación 3D de contornos\]](#)

$$\{x, -30, 0\}, \{y, -30, 0\}, \{z, -10, 1\}]$$

In[]:=

$$\text{pp} := \begin{pmatrix} 4 & 2 & 3 & 0 \\ 2 & 1 & -2 & 1 \\ 3 & -2 & 4 & -2 \\ 0 & 1 & -2 & 1 \end{pmatrix}$$

$$\text{p} := \begin{pmatrix} 1 & -2 & 1 \\ -2 & 4 & -2 \\ 1 & -2 & 1 \end{pmatrix}$$

$$\text{Det}\left[\begin{pmatrix} 4 & 2 & 0 \\ 3 & -2 & -2 \\ 0 & 1 & 1 \end{pmatrix}\right]$$

[\[determinante\]](#)

Out[]:= -6

In[]:= **CharacteristicPolynomial**[pp, x]

[polinomio característico](#)

CharacteristicPolynomial[p, x]

[polinomio característico](#)

Eigenvalues[p]

[autovalores](#)

Eigenvectors[p]

[autovectores](#)

Out[]:= $62 x + 11 x^2 - 10 x^3 + x^4$

Out[]:= $6 x^2 - x^3$

Out[]:= $\{6, 0, 0\}$

Out[]:= $\{\{1, -2, 1\}, \{-1, 0, 1\}, \{2, 1, 0\}\}$

In[]:=

Eigenvalues[p]

[autovalores](#)

Eigenvectors[p]

[autovectores](#)

In[]:=

Solve[$\{\{0, 1, -2, 1\} \cdot \text{pp} \cdot \{1, x, y, z\} == 0,$

[resuelve](#)

$x^2 + 4 y^2 + z^2 - 4 x y + 2 x z - 4 y z + 2 x - 3 y + 4 == 0\}, \{x, y, z\}]$

 **Solve**: Equations may not give solutions for all "solve" variables.

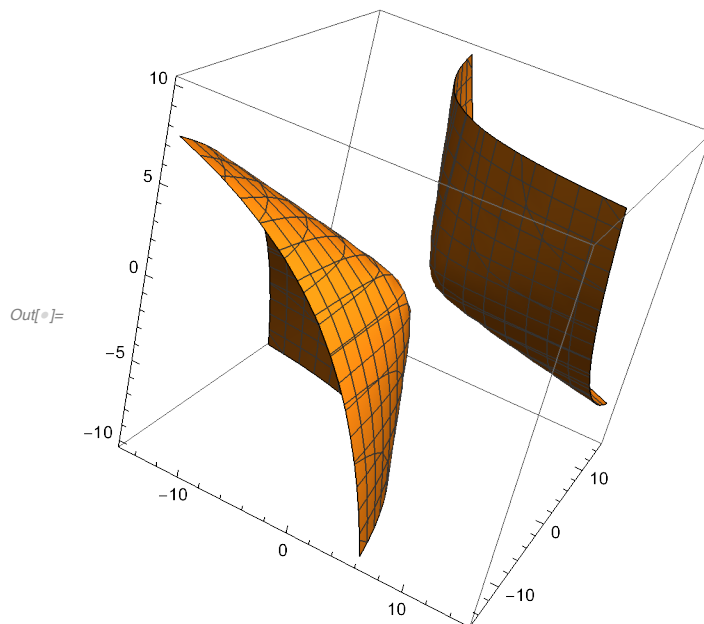
Out[]:= $\left\{ \left\{ x \rightarrow \frac{1}{18} (-40 + 27 y), z \rightarrow \frac{1}{18} (52 + 9 y) \right\} \right\}$

CILINDRO PARABOLICO DE EJE

$$\left\{ \left\{ x \rightarrow \frac{1}{18} (-40 + 27 y), z \rightarrow \frac{1}{18} (52 + 9 y) \right\} \right\}$$

In[*]:=

```
ContourPlot3D[2 x y + 2 x z + 2 y z - 2 == 0, {x, -15, 15}, {y, -15, 15}, {z, -10, 10}]
```

[representación 3D de contornos](#)


In[*]:=

$$\mathbf{qq} := \begin{pmatrix} -2 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 \end{pmatrix}$$

$$\mathbf{q} := \begin{pmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{pmatrix}$$

```

In[*]:= CharacteristicPolynomial[qq, x]
         |polinomio característico
         CharacteristicPolynomial[q, x]
         |polinomio característico
         Eigenvalues[q]
         |autovalores
         Eigenvectors[q]
         |autovectores

```

```
Out[*]= -4 - 8 x - 3 x^2 + 2 x^3 + x^4
```

```
Out[*]= 2 + 3 x - x^3
```

```
Out[*]= {2, -1, -1}
```

```
Out[*]= {{1, 1, 1}, {-1, 0, 1}, {-1, 1, 0}}
```

Forma reducida := $a = 2x^2 - y^2 - z^2$ Hiperboloide de dos hojas

```

Det[qq] = -4 = -2 a,
         |determinante

```

```

In[*]:= Solve[{{0, 1, 1, 1}.qq.{1, x, y, z} == 0,
               |resuelve
               {0, -1, 0, 1}.qq.{1, x, y, z} == 0, {0, -1, 1, 0}.qq.{1, x, y, z} == 0}, {x, y, z}]
Out[*]= {{x -> 0, y -> 0, z -> 0}}

```

Sistema de referencia := $\{(0, 0, 0), \text{Normalizar} \{\{1, 1, 1\}, \{-1, 0, 1\}, \{-1, 1, 0\}\}\}$