

$$3) 6- x^2 - 2xy + y^2 + 8x + 8y = 0$$

Cuadrático

$$x^2 - 2xy + y^2 = (x \ y) \begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

$$\begin{pmatrix} 1-2 & -1 \\ -1 & 1-2 \end{pmatrix} = (1-\lambda)^2 - 1 = \lambda^2 - 2\lambda \rightarrow \lambda=0 \\ \lambda=2$$

$$E_2 = \begin{pmatrix} -1 & -1 \\ -1 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \rightarrow -x - y = 0 \rightarrow \underline{x = -y}$$

$$E_2 = \text{gen} \left\{ \begin{pmatrix} 1 \\ -1 \end{pmatrix} \right\}$$

$$E_0 = \begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \rightarrow x - y = 0 \rightarrow \underline{x = y}$$

$$E_0 = \text{gen} \left\{ \begin{pmatrix} 1 \\ 1 \end{pmatrix} \right\}$$

$$B_1 = \left\{ \begin{pmatrix} 1 \\ 1 \end{pmatrix}, \begin{pmatrix} 1 \\ -1 \end{pmatrix} \right\}$$

$$A = \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix} \begin{pmatrix} 0 & 0 \\ 0 & 2 \end{pmatrix} \begin{pmatrix} 1/2 & 1/2 \\ 1/2 & -1/2 \end{pmatrix}$$

$$\| (1, 1) \| = \sqrt{2}$$

$$\| (1, -1) \| = \sqrt{2}$$

$$B_{on} = \left\{ \left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}} \right), \left(\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}} \right) \right\}$$

$$A = \begin{pmatrix} 1/\sqrt{2} & 1/\sqrt{2} \\ 1/\sqrt{2} & -1/\sqrt{2} \end{pmatrix} \begin{pmatrix} 0 & 0 \\ 0 & 2 \end{pmatrix} \begin{pmatrix} 1/\sqrt{2} & 1/\sqrt{2} \\ 1/\sqrt{2} & -1/\sqrt{2} \end{pmatrix}$$

$$(x \ y) \begin{pmatrix} 1/\sqrt{2} & 1/\sqrt{2} \\ 1/\sqrt{2} & -1/\sqrt{2} \end{pmatrix} \begin{pmatrix} 0 & 0 \\ 0 & 2 \end{pmatrix} \begin{pmatrix} 1/\sqrt{2} & 1/\sqrt{2} \\ 1/\sqrt{2} & -1/\sqrt{2} \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

$$(x' \ y') \begin{pmatrix} 0 & 0 \\ 0 & 2 \end{pmatrix} \begin{pmatrix} x' \\ y' \end{pmatrix} = 2y'^2$$

Lineal

$$8x + 8y = \begin{pmatrix} 8 & 8 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 8 & 8 \end{pmatrix} C_{BE} \begin{pmatrix} x' \\ y' \end{pmatrix}$$

$$\begin{pmatrix} 8 & 8 \end{pmatrix} \begin{pmatrix} 1/\sqrt{2} & 1/\sqrt{2} \\ 1/\sqrt{2} & -1/\sqrt{2} \end{pmatrix} \cdot \begin{pmatrix} x' \\ y' \end{pmatrix} = 8\sqrt{2}x$$

$$2y'^2 + 8\sqrt{2}x = 0$$

$$d) 4x^2 + 6xy - 4y^2 - 5 = 0$$

$$(x \ y) \begin{pmatrix} 4 & 3 \\ 3 & -4 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

$$\begin{pmatrix} 4-\lambda & 3 \\ 3 & -4-\lambda \end{pmatrix} = (4-\lambda)(-4-\lambda) - 9 = (\lambda^2 - 25) \rightarrow \lambda = 5$$

\downarrow
 $\lambda = -5$

$$E_{\lambda=5} = \begin{pmatrix} 9 & 3 \\ 3 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

$$3x = -y$$

$$3x = -y$$

$$-3x = y$$

$$E_{\lambda=-5} = \text{gen} \left\{ \begin{pmatrix} 1 \\ -3 \end{pmatrix} \right\}$$

$$E_{\lambda=5} = \begin{pmatrix} -1 & 3 \\ 3 & 9 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

$$y = 3x \quad 3y = x$$

$$E_{\lambda=-5} = \text{gen} \left\{ \begin{pmatrix} 3 \\ 1 \end{pmatrix} \right\}$$

$$\| (3, 1) \| = \sqrt{10}$$

$$\| (-1, -3) \| = \sqrt{10}$$

$$B_{on} = \left\{ \left(\frac{3}{\sqrt{10}}, \frac{1}{\sqrt{10}} \right), \left(\frac{1}{\sqrt{10}}, \frac{-3}{\sqrt{10}} \right) \right\}$$

$$(x' \ y') \begin{pmatrix} -5 & 0 \\ 0 & 5 \end{pmatrix} \begin{pmatrix} x' \\ y' \end{pmatrix}$$

$$-5x'^2 + 5y'^2 - 5 = 0$$

$$-x^2 + y^2 = 1$$

$$f) 6x^2 - 4xy + 9y^2 - 20x - 10y - 5 = 0$$

$$(x \ y) \begin{pmatrix} 6 & -2 \\ -2 & 9 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

$$\begin{pmatrix} 6-\lambda & -2 \\ -2 & 9-\lambda \end{pmatrix} = (6-\lambda)(9-\lambda) - 4 = \lambda^2 - 15\lambda + 50$$

$$\lambda = 10 \quad \lambda = 5$$

$$E_{\lambda=10} = \begin{pmatrix} -4 & -2 \\ -2 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \rightarrow -2x = y$$

$$E_{\lambda=10} = \text{gen} \left\{ \begin{pmatrix} 1 \\ -2 \end{pmatrix} \right\}$$

$$E_{\lambda=5} = \begin{pmatrix} 1 & -2 \\ -2 & 4 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \rightarrow x = 2y$$

$$E_{\lambda=5} = \text{gen} \left\{ \begin{pmatrix} 2 \\ 1 \end{pmatrix} \right\}$$

$$\| (1, -2) \| = \sqrt{5}$$

$$\| (2, 1) \| = \sqrt{5}$$

$$B_{on} = \left\{ \left(\frac{1}{\sqrt{5}}, \frac{-2}{\sqrt{5}} \right), \left(\frac{2}{\sqrt{5}}, \frac{1}{\sqrt{5}} \right) \right\}$$

$$(x' \ y') \begin{pmatrix} 10 & 0 \\ 0 & 5 \end{pmatrix} \begin{pmatrix} x' \\ y' \end{pmatrix} = 10x'^2 + 5y'^2$$

$$-20x - 10y = \begin{pmatrix} -20 & -10 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

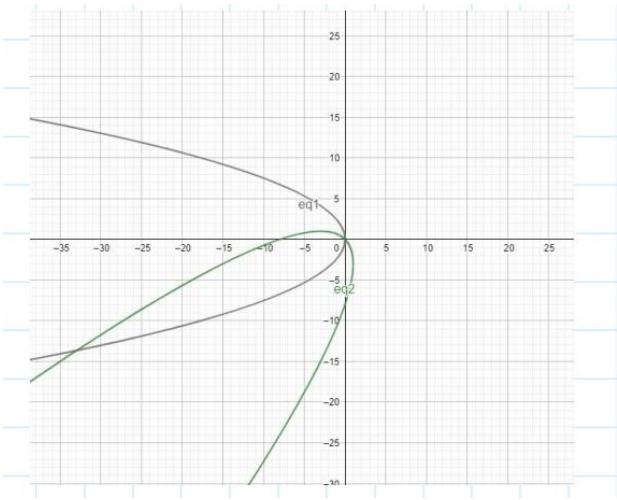
$$\begin{pmatrix} -20 & -10 \end{pmatrix} \begin{pmatrix} 1/\sqrt{5} & 2/\sqrt{5} \\ -2/\sqrt{5} & 1/\sqrt{5} \end{pmatrix} \begin{pmatrix} x' \\ y' \end{pmatrix} = \sqrt{-10\sqrt{5}} \, y'$$

$$10x^2 + 5y^2 - 10\sqrt{5} \, y - 5 = 0$$

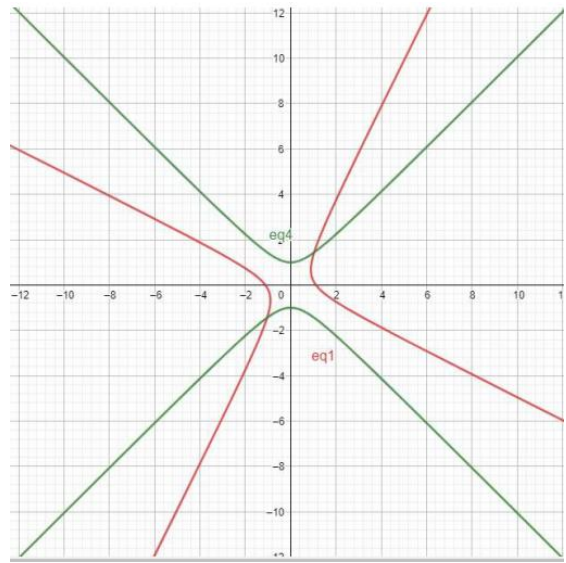
$$2x^2 + y^2 - 2\sqrt{5}y = 1$$

Graficos:

3b)



3d)



3f)

