

taller de la hiperbola

1. Una hiperbola es el conjunto de todos los puntos del plano para el que la diferencia de las distancias desde dos puntos fijos F_1 y F_2 es constante. Los puntos F_1 y F_2 se llaman **focos** de la hiperbola.

2. La gráfica de la ecuación $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ con $a > 0, b > 0$ es

$$\frac{x^2}{9} - \frac{y^2}{4} = 1$$

$$a = \sqrt{9} \quad b = \sqrt{4}$$

$$a = 3 \quad b = 2$$

$$a^2 = 9 \quad b^2 = 4$$

$$c^2 = a^2 + b^2$$

$$c^2 = 9 + 4$$

$$\sqrt{c^2} = \sqrt{13}$$

$$c = 3.6$$

una hiperbola con vértices $(9, 0)$ y $(-9, 0)$ y focos $(\pm c, 0)$, donde $c = \pm 3.6$. Por tanto, la gráfica de $\frac{x^2}{4^2} - \frac{y^2}{3^2} = 1$

$$\frac{x^2}{16} - \frac{y^2}{9} = 1$$

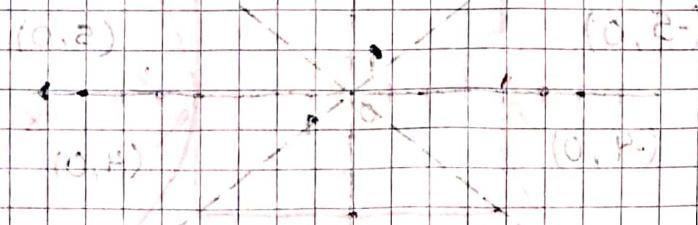
$$\sqrt{a^2} = \sqrt{16} \quad \sqrt{b^2} = \sqrt{9}$$

$$a = 4$$

$$c = \sqrt{16 + 9}$$

$$\sqrt{c^2} = \sqrt{25} = 5$$

es una hiperbola con vértices $(4, 0)$ y $(-4, 0)$ y focos $(5, 0)$ y $(-5, 0)$.



3. La gráfica de la ecuación $\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$ con $a > 0, b > 0$ es una hipérbola con vértices $(0, \pm a)$ y $(0, \mp b)$ y focos $(0, \pm c)$ donde $c = \sqrt{a^2 + b^2}$.

$$\frac{y^2}{9} - \frac{x^2}{4} = 1$$

$$c = \sqrt{13} = 3.6$$

$$a = 3 \quad b = 2$$

Por lo tanto, la gráfica de $\frac{y^2}{9} - \frac{x^2}{4} = 1$ es una hipérbola.

$$\frac{y^2}{16} - \frac{x^2}{9} = 1$$

$$c = \sqrt{25} = 5$$

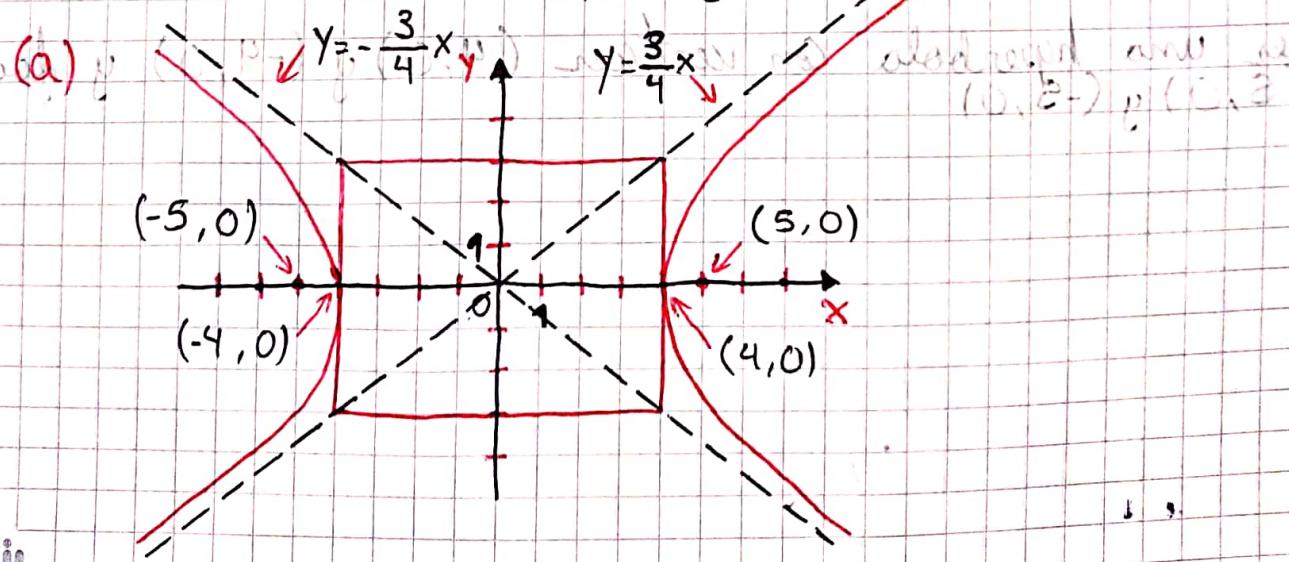
$$a = 4 \quad b = 3$$

Con vértices $(0, 4)$ y $(0, -4)$ y focos $(0, 5)$ y $(0, -5)$

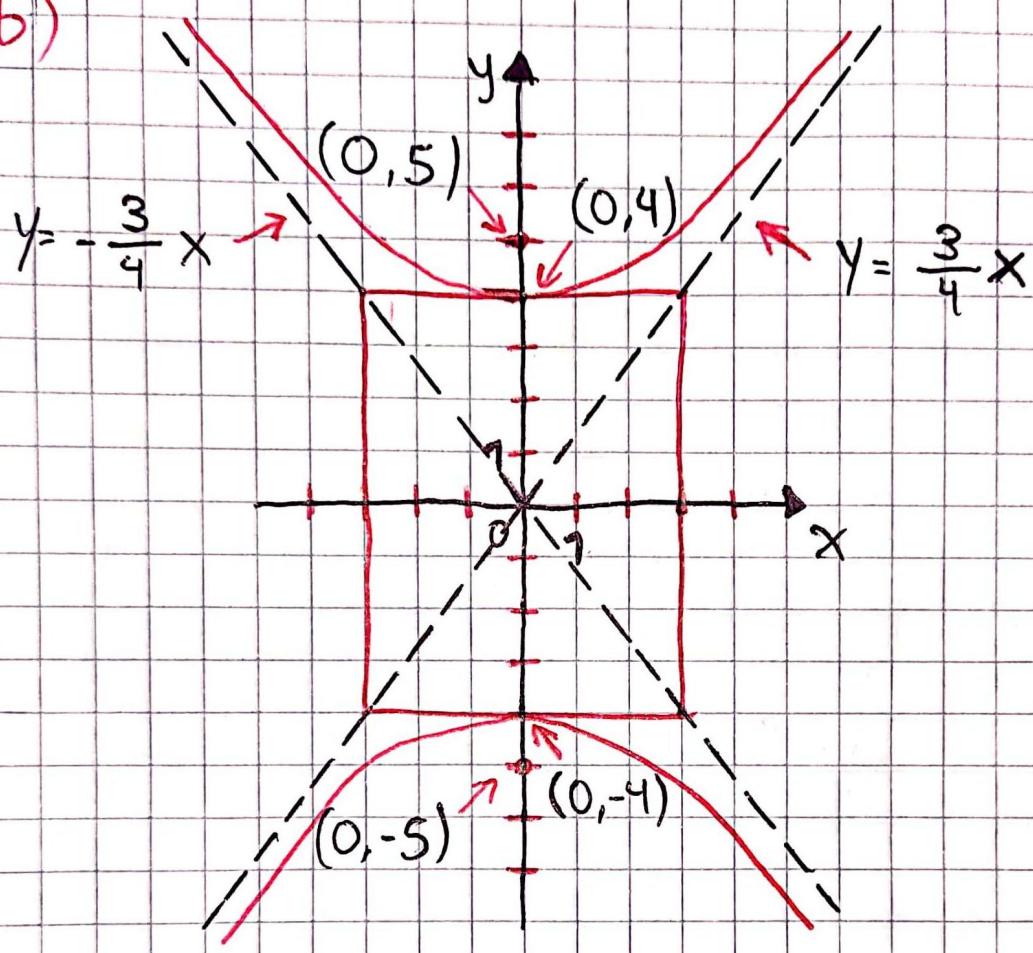
4. Atrávese coordenada a los vértices, focos y asíntotas en las gráficas dadas por las hipérbolas de los ejercicios 2 y 3.

$$(a) \frac{x^2}{4^2} - \frac{y^2}{3^2} = 1$$

$$(b) \frac{y^2}{4^2} - \frac{x^2}{3^2} = 1$$



(b)



Habilidades

5.-8 ■ Relacione la ecuación con los graficos marcados I - IV.
De razonar para res. respuestas

$$5. \frac{x^2}{16} + \frac{y^2}{4} = 1 \quad \boxed{\text{II}}$$

$$\sqrt{a^2} = \sqrt{16} ; \quad \sqrt{b^2} = \sqrt{4}$$

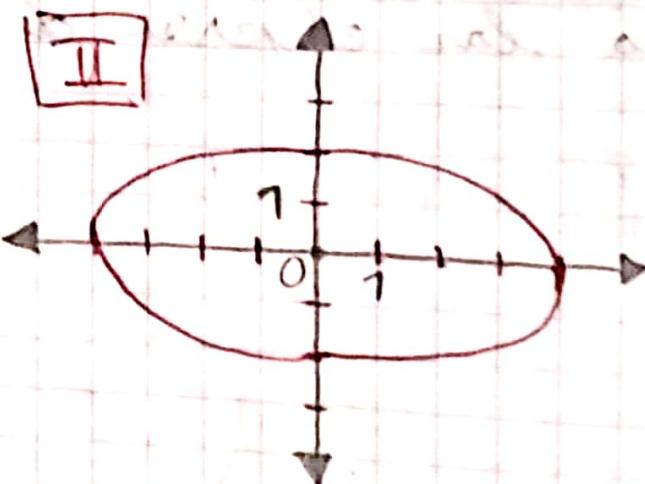
$$a = 4$$

$$b = 2$$

$$\sqrt{c^2} = \sqrt{a^2 - b^2}$$

$$c = \sqrt{16 - 4}$$

$$c = \sqrt{12} \approx 3,4$$



marfil

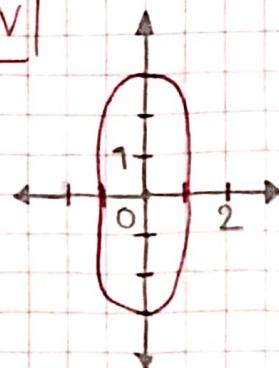
$$6. \frac{x^2}{1} + \frac{y^2}{9} = 1 \quad \boxed{\text{IV}}$$

$$\sqrt{b^2} = \sqrt{1} \quad \sqrt{a^2} = \sqrt{9}$$

$$b = 1$$

$$a = 3$$

$\boxed{\text{IV}}$



$$\sqrt{c^2} = \sqrt{a^2 - b^2}$$

$$c = \sqrt{9-1}$$

$$c = 2\sqrt{2}$$

$$7. \frac{4x^2}{4} + \frac{y^2}{4} = \frac{4}{4}$$

$$\frac{x^2}{4} + \frac{y^2}{4} = 1$$

$\boxed{\text{I}}$

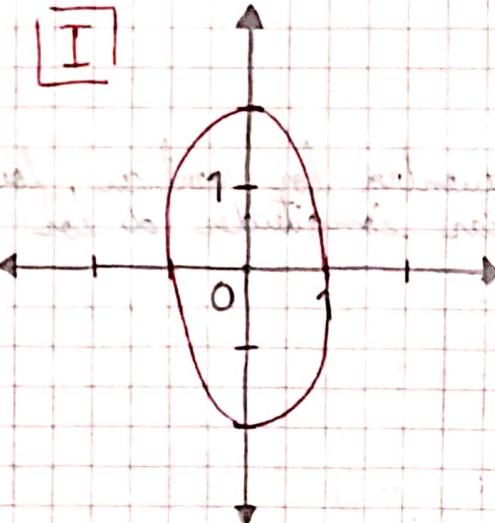
$\boxed{\text{I}}$

$$x^2 + \frac{y^2}{4} = 1$$

$$\sqrt{a^2} = \sqrt{4} \quad \sqrt{b^2} = \sqrt{1}$$

$$a = 2$$

$$b = 1$$



$$\sqrt{c^2} = \sqrt{a^2 - b^2}$$

$$c = \sqrt{4-1}$$

$$c = \sqrt{3}$$

$$8. \quad 16x^2 + 25y^2 = 400$$

$$\frac{x^2}{\frac{400}{16}} + \frac{y^2}{\frac{400}{25}} = \frac{400}{400}$$

$$\frac{x^2}{25} + \frac{y^2}{16} = 1$$

$$\sqrt{a^2} = \sqrt{25} \quad \sqrt{b^2} = \sqrt{16}$$

$$a = 5 \quad b = 4$$

$$\sqrt{c^2} = \sqrt{a^2 - b^2}$$

$$c = \sqrt{25 - 16}$$

$$c = \sqrt{9} = 3$$

9-22 ■ Encuentra los vértices, focos y excentricidad de la elipse. Determina las longitudes de los ejes mayor y menor, y traza la gráfica.

$$9. \quad \frac{x^2}{25} + \frac{y^2}{9} = 1$$

$$\sqrt{a^2} = \sqrt{25} \quad \sqrt{b^2} = \sqrt{9}$$

$$a = 5 \quad b = 3$$

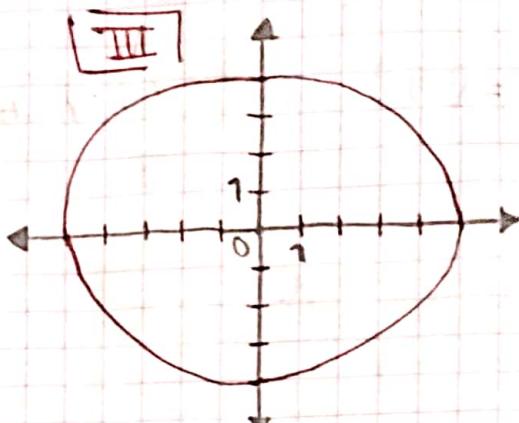
$$c = \sqrt{a^2 - b^2}$$

$$c = \sqrt{25 - 9}$$

$$c = \sqrt{16} = 4$$

$$e = \frac{c}{a}$$

$$e = \frac{4}{5} \approx 0,8$$



$$V_1 = (5, 0)$$

Eje mayor:

$$V_2 = (-5, 0)$$

$$2a$$

$$2 \cdot 5 = 10$$

$$F_1 = (4, 0)$$

Eje menor:

$$2b$$

$$2 \cdot 3 = 6$$

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Calc. Gráfica



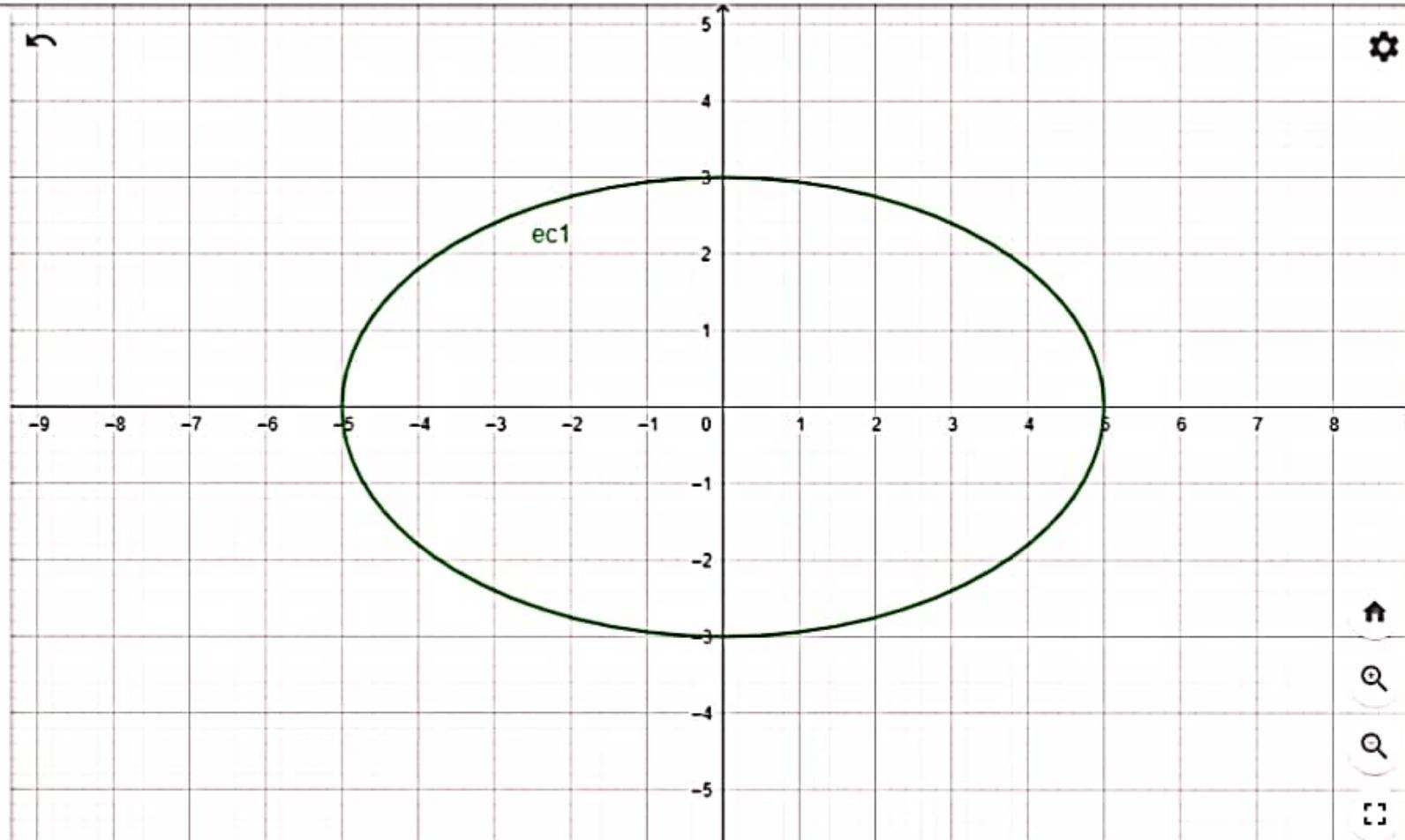
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ec1: $x^2 / 25 + y^2 / 9 = 1$

+ Entrada...



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$$10. \frac{x^2}{16} + \frac{y^2}{25} = 1$$

$$\sqrt{a^2} = \sqrt{25} \quad \sqrt{b^2} = \sqrt{16}$$

$$a = 5$$

$$b = 4$$

$$c = \sqrt{25 - 16}$$

$$c = \sqrt{9} = 3$$

$$V_1 = (0, 5)$$

$$V_2 = (0, -5)$$

$$F_1 = (0, 3)$$

$$F_2 = (0, -3)$$

Eje mayor:

$$2 \cdot 5 = 10$$

Eje menor:

$$2 \cdot 4 = 8$$

$$e = \frac{3}{5} \approx 0,6$$



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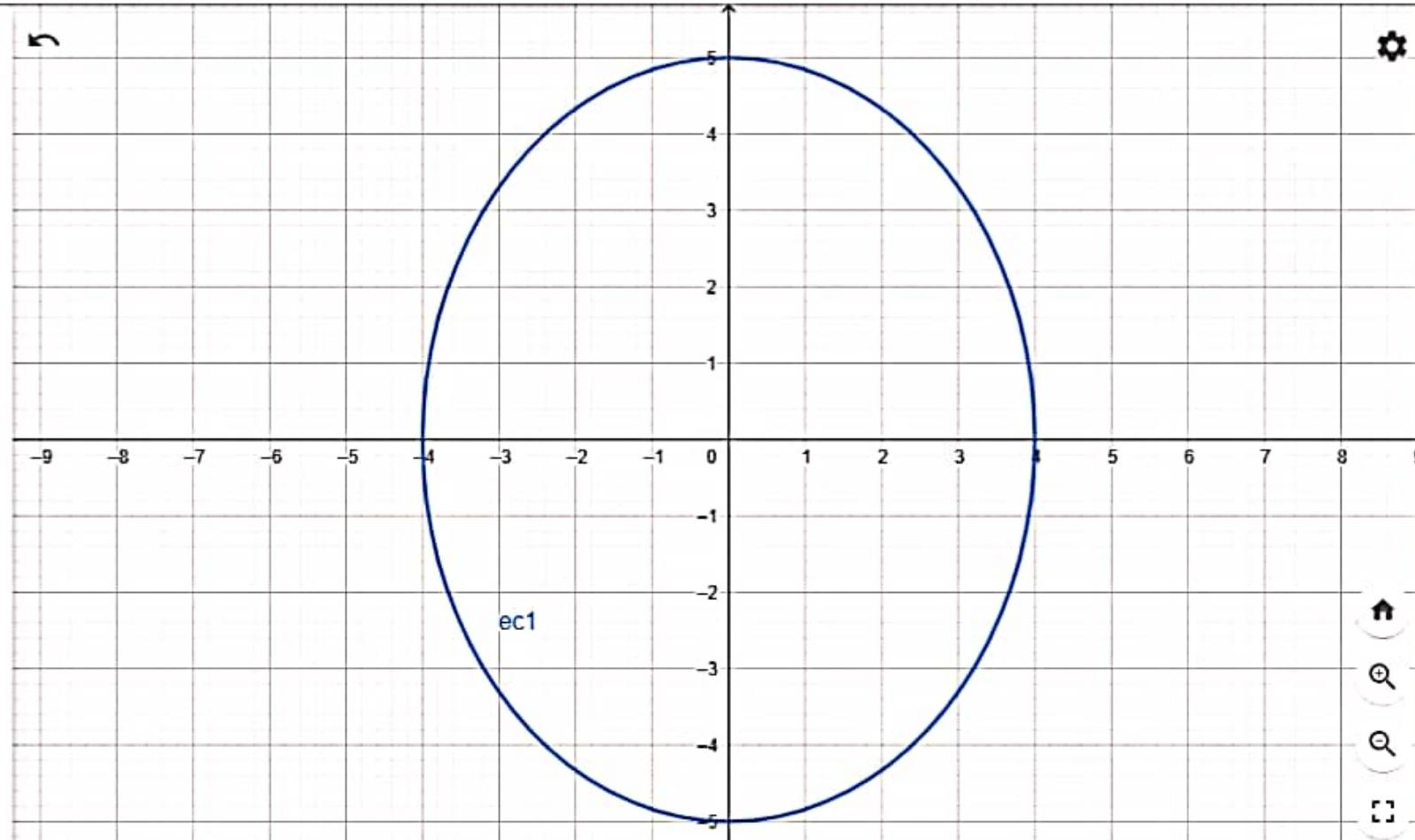
ABRIR SESIÓN

ec1: $x^2 / 16 + y^2 / 25 = 1$ 

Entrada...



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$$11. 9x^2 + 4y^2 = 36$$

$$\frac{x^2}{\frac{36}{9}} + \frac{y^2}{\frac{36}{4}} = \frac{36}{36}$$

$$\frac{x^2}{4} + \frac{y^2}{9} = 1$$

$$\sqrt{a^2} = \sqrt{9} \quad \sqrt{b^2} = \sqrt{4}$$

$$a = 3$$

$$b = 2$$

$$c = \sqrt{9 - 4}$$

$$c = \sqrt{5}$$

$$e = \frac{c}{a} = \frac{\sqrt{5}}{3} \approx 0,74$$

$$V_1 = (0, 3)$$

$$V_2 = (0, -3)$$

$$F_1 = (0, \sqrt{5})$$

$$F_2 = (0, -\sqrt{5})$$

Eje mayor:

$$2 \cdot 3 = 6$$

Eje menor:

$$2 \cdot 2 = 4$$

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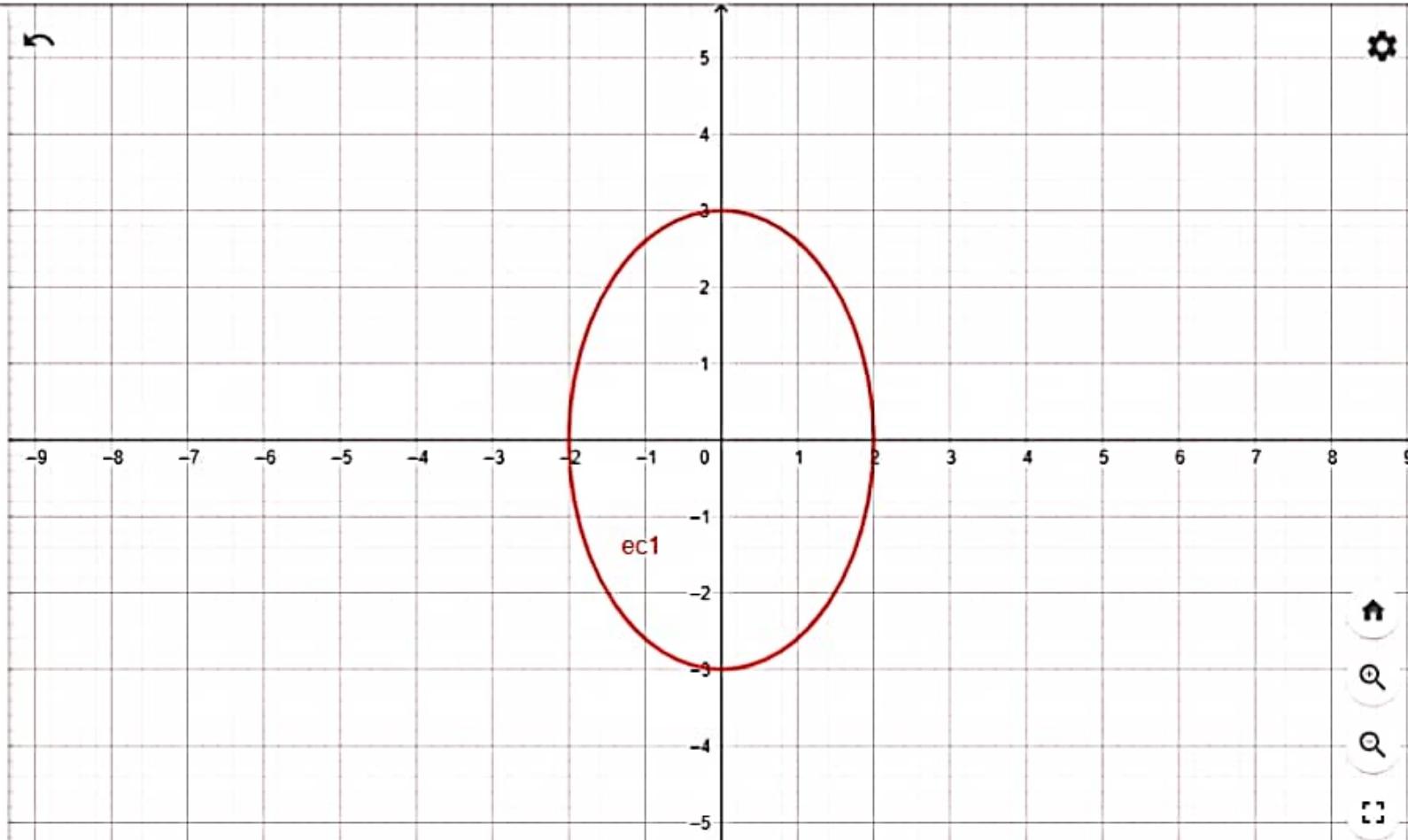
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ec1: $9x^2 + 4y^2 = 36$

Entrada...



Suite Calculadora Geogebra



$$12. \quad 4x^2 + 25y^2 = 100$$

$$\frac{x^2}{\frac{100}{4}} + \frac{y^2}{\frac{100}{25}} = \frac{100}{100}$$

$$\frac{x^2}{25} + \frac{y^2}{4} = 1$$

$$V_1 = (5, 0)$$

$$V_2 = (-5, 0)$$

$$F_1 = (\sqrt{21}, 0)$$

$$F_2 = (-\sqrt{21}, 0)$$

Eje mayor:

$$2 \cdot 5 = 10$$

Eje menor:

$$2 \cdot 2 = 4$$

$$\sqrt{a^2} = \sqrt{25}$$

$$\sqrt{b^2} = \sqrt{4}$$

$$a = 5$$

$$b = 2$$

$$c = \sqrt{25 - 4}$$

$$c = \sqrt{21}$$

$$e = \frac{c}{a} = \frac{\sqrt{21}}{5}$$

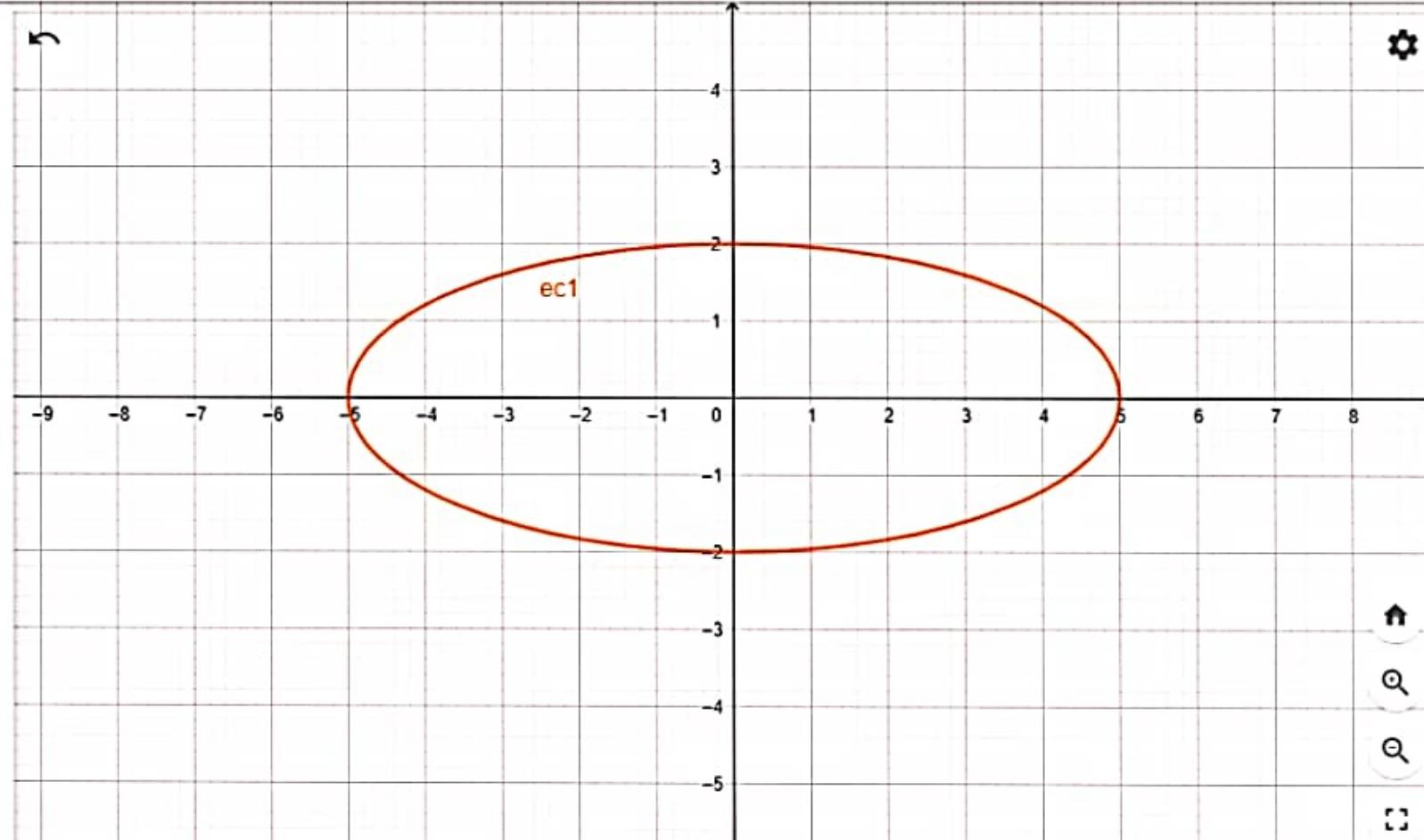
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ABRIR SESIÓN

ec1: $4x^2 + 25y^2 = 100$



Álgebra

Tienda

Tabla

Suite Calculadora Geogebra



$$13. \quad x^2 + 4y^2 = 16$$

$$\frac{x^2}{16} + \frac{y^2}{4} = \frac{16}{16}$$

$$\frac{x^2}{16} + \frac{y^2}{4} = 1$$

$$V_1 = (4, 0)$$

$$V_2 = (-4, 0)$$

$$F_1 = (2\sqrt{3}, 0)$$

$$F_2 = (-2\sqrt{3}, 0)$$

eje mayor:

$$2 \cdot 4 = 8$$

eje menor:

$$2 \cdot 2 = 4$$

$$\sqrt{a^2} = \sqrt{16} \quad \sqrt{b^2} = \sqrt{4}$$

$$a = 4$$

$$b = 2$$

$$c = \sqrt{16 - 4}$$

$$c = \sqrt{12}$$

$$c = 2\sqrt{3}$$

$$e = \frac{2\sqrt{3}}{4} = \frac{\sqrt{3}}{2}$$



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Álgebra

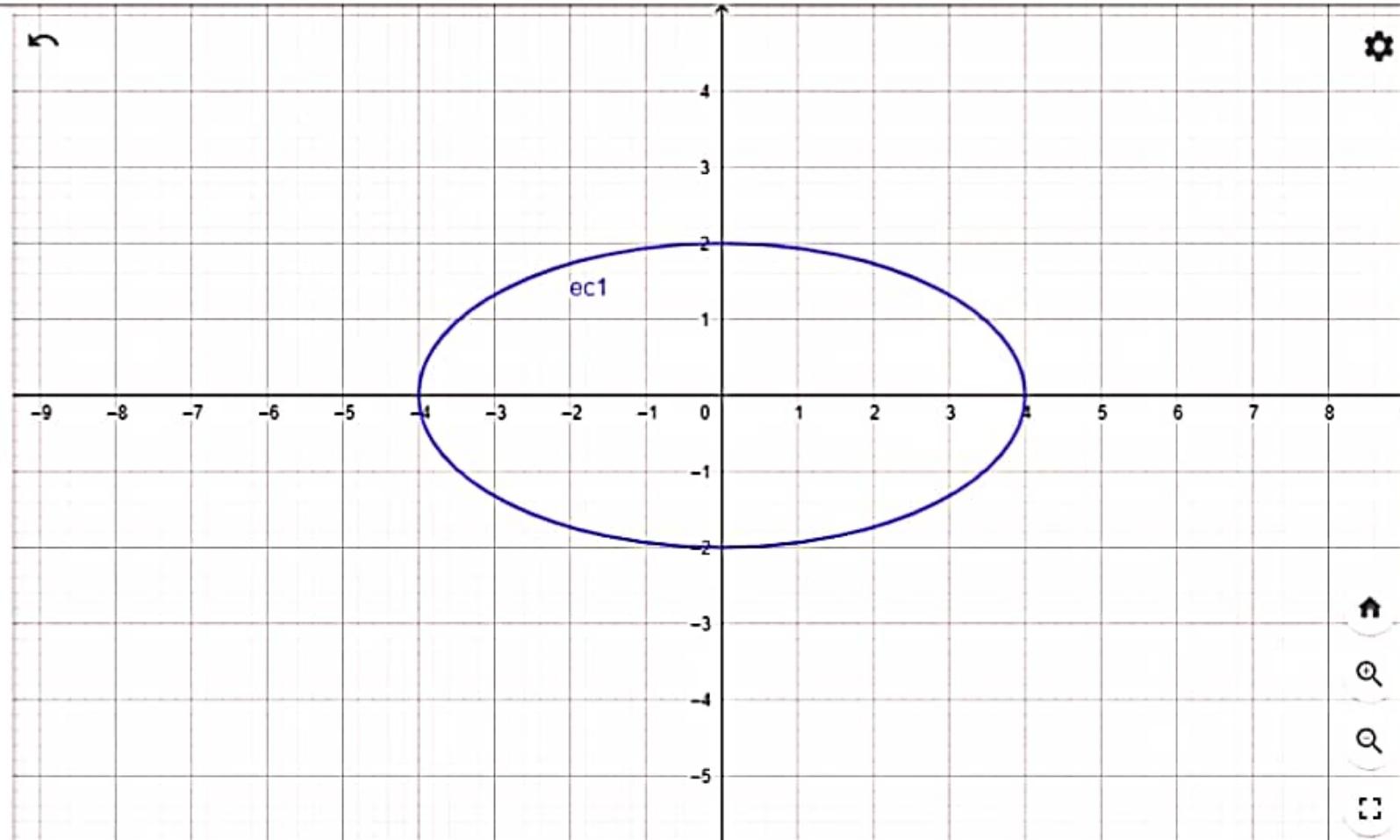
ec1: $x^2 + 4y^2 = 16$

Entrada...

Entornos

Tabla

Suite Calculadora Geogebra



$$LR = \frac{2b}{a}$$

$$14. 4x^2 + y^2 = 16$$

$$\frac{x^2}{16} + \frac{y^2}{16} = \frac{16}{16}$$

$$\frac{x^2}{4} + \frac{y^2}{16} = 1$$

$$\sqrt{a^2} = \sqrt{16}$$

$$a = 4$$

$$c = \sqrt{16 - 4}$$

$$c = \sqrt{12}$$

$$c = 2\sqrt{3}$$

$$V_1 = (0, 4)$$

$$V_2 = (0, -4)$$

$$F_1 = (0, 2\sqrt{3})$$

$$F_2 = (0, -2\sqrt{3})$$

Eje mayor:

$$2 \cdot 4 = 8$$

Eje menor:

$$2 \cdot 2 = 4$$

$$\sqrt{b^2} = \sqrt{4}$$

$$b = 2$$

$$e = \frac{2\sqrt{3}}{4} = \frac{\sqrt{3}}{2}$$



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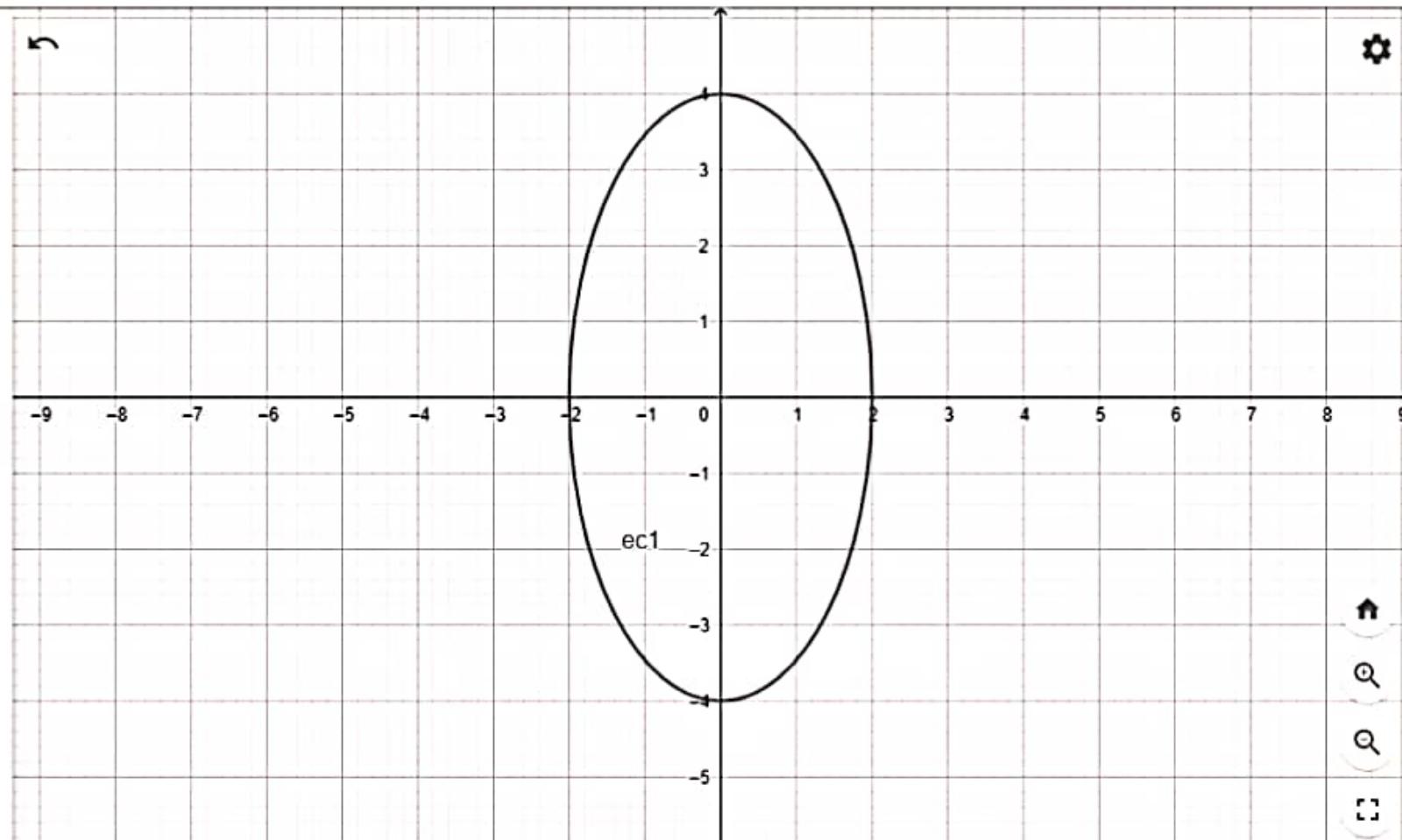
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ec1: $4x^2 + y^2 = 16$ 

Entrada...



Suite Calculadora Geogebra



$$15. 2x^2 + y^2 = 3$$

$$\frac{x^2}{\frac{3}{2}} + \frac{y^2}{1} = \frac{3}{3}$$

$$V_1 = (0, \sqrt{3})$$

Eje mayor:

$$2 \cdot \sqrt{3} = 2\sqrt{3}$$

$$\frac{x^2}{\frac{3}{2}} + \frac{y^2}{3} = 1$$

$$F_1 = (0, \frac{\sqrt{6}}{2})$$

Eje menor

$$F_2 = (0, -\frac{\sqrt{6}}{2})$$

$$2 \cdot \frac{\sqrt{6}}{2} = \sqrt{6}$$

$$\sqrt{a^2} = \sqrt{3}$$

$$\sqrt{b^2} = \sqrt{\frac{3}{2}}$$

$$a = \sqrt{3}$$

$$b = \frac{\sqrt{6}}{2}$$

$$c = \sqrt{\frac{3}{1} - \frac{3}{2}}$$

$$c = \sqrt{\frac{3}{2}} = \frac{\sqrt{6}}{2}$$

$$e = \frac{\frac{\sqrt{6}}{2}}{\frac{\sqrt{3}}{1}} = \frac{\sqrt{6} \times 1}{2 \times \sqrt{3}} = \frac{\sqrt{6}}{2\sqrt{3}} = \frac{\sqrt{2}}{2}$$

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Calc. Gráfica ▾



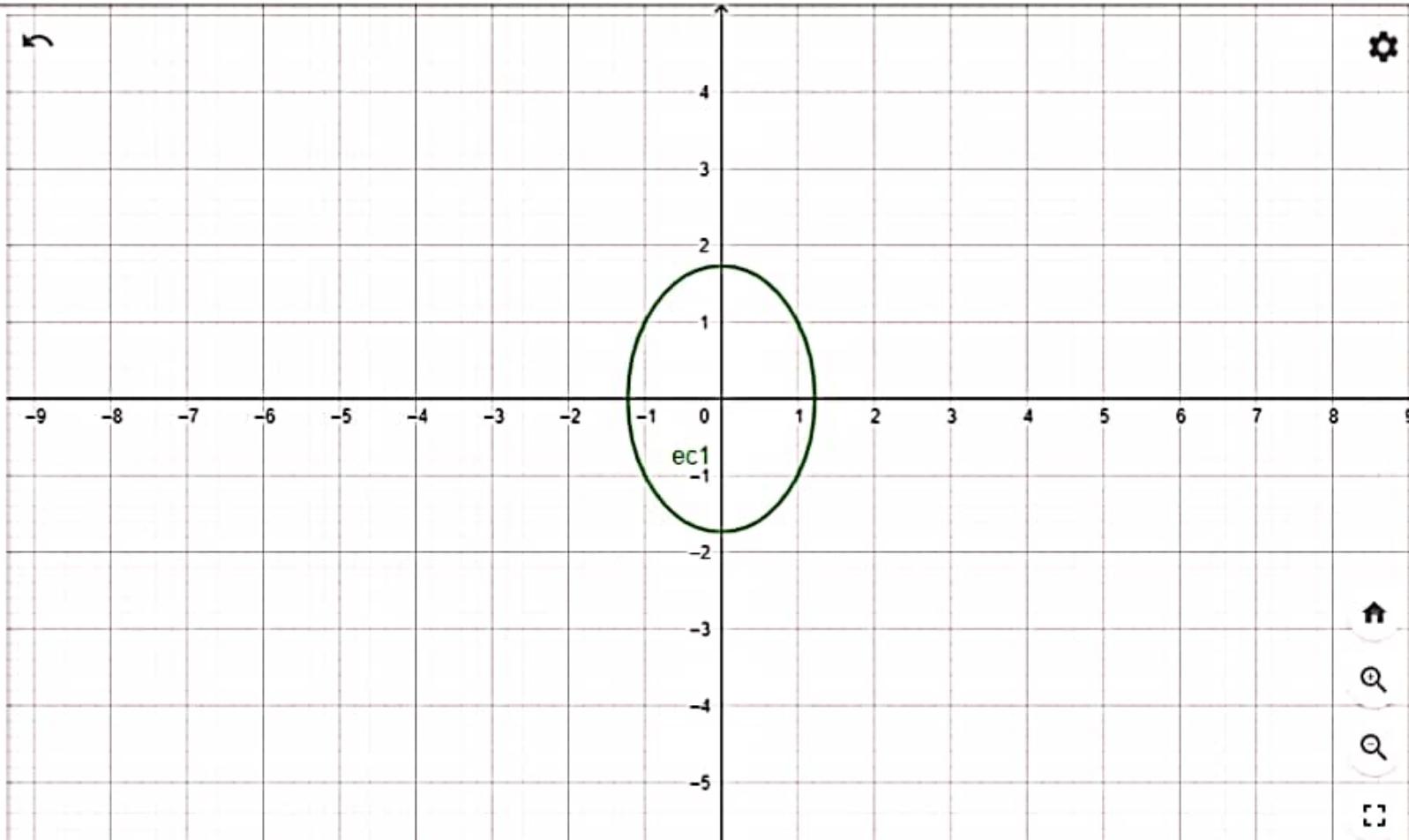
ABRIR SESIÓN

ec1: $2x^2 + y^2 = 3$

+ Entrada...



Suite Calculadora Geogebra



$$16. \quad 5x^2 + 6y^2 = 30$$

$$\frac{x^2}{30} + \frac{y^2}{30} = \frac{30}{30}$$
$$\frac{5}{6}$$

$$\frac{x^2}{6} + \frac{y^2}{5} = 1$$

$$V_1(\sqrt{6}, 0)$$

$$V_2(-\sqrt{6}, 0)$$

$$F_1(1, 0)$$

$$F_2(-1, 0)$$

Eje mayor:

$$2 \cdot \sqrt{6} = 2\sqrt{6}$$

Eje menor:

$$2 \cdot \sqrt{5} = 2\sqrt{5}$$

$$\sqrt{a^2} = \sqrt{6} \quad \sqrt{b^2} = \sqrt{5}$$

$$a = \sqrt{6}$$

$$b = \sqrt{5}$$

$$c = \sqrt{6 - 5}$$

$$c = \sqrt{1} = 1$$

$$e = \frac{1}{\sqrt{6}} = \frac{\sqrt{6}}{6}$$

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ABRIR SESIÓN

ec1: $5x^2 + 6y^2 = 30$



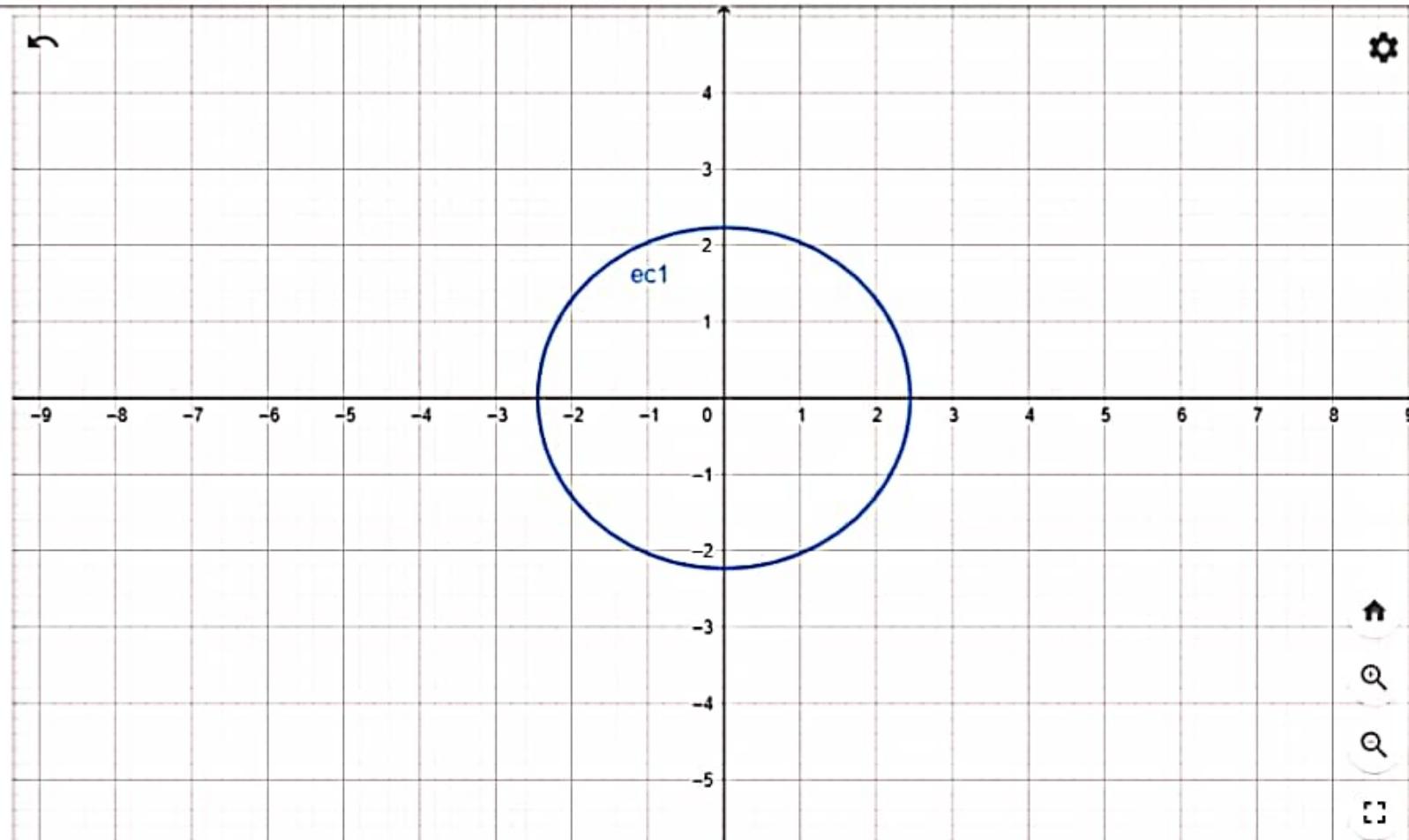
+ Entrada...

Álgebra

Herramientas

Tabla

Suite Calculadora Geogebra



$$17. x^2 + 4y^2 = 1$$

$$\frac{x^2}{1} + \frac{y^2}{\frac{1}{4}} = 1$$

$$x^2 + \frac{y^2}{\frac{1}{4}} = 1$$

$V_1(1, 0)$

$V_2(-1, 0)$

Eje mayor:

$$2 \cdot 1 = 2$$

$F_1\left(\frac{\sqrt{3}}{2}, 0\right)$

$F_2\left(-\frac{\sqrt{3}}{2}, 0\right)$

Eje menor:

$$2 \cdot \frac{1}{2} = 1$$

$$\sqrt{a^2} = \sqrt{1}$$

$$\sqrt{b^2} = \sqrt{\frac{1}{4}}$$

$$a = 1$$

$$b = \frac{1}{2}$$

$$c = \sqrt{1 - \frac{1}{4}}$$

$$c = \sqrt{\frac{3}{4}} = \frac{\sqrt{3}}{2}$$

mar4L

$$e = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \frac{\sqrt{3} \times 1}{2 \times 1} = \frac{\sqrt{3}}{2}$$



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Calc. Gráfica



ABRIR SESIÓN

Álgebra

ec1: $x^2 + 4y^2 = 1$

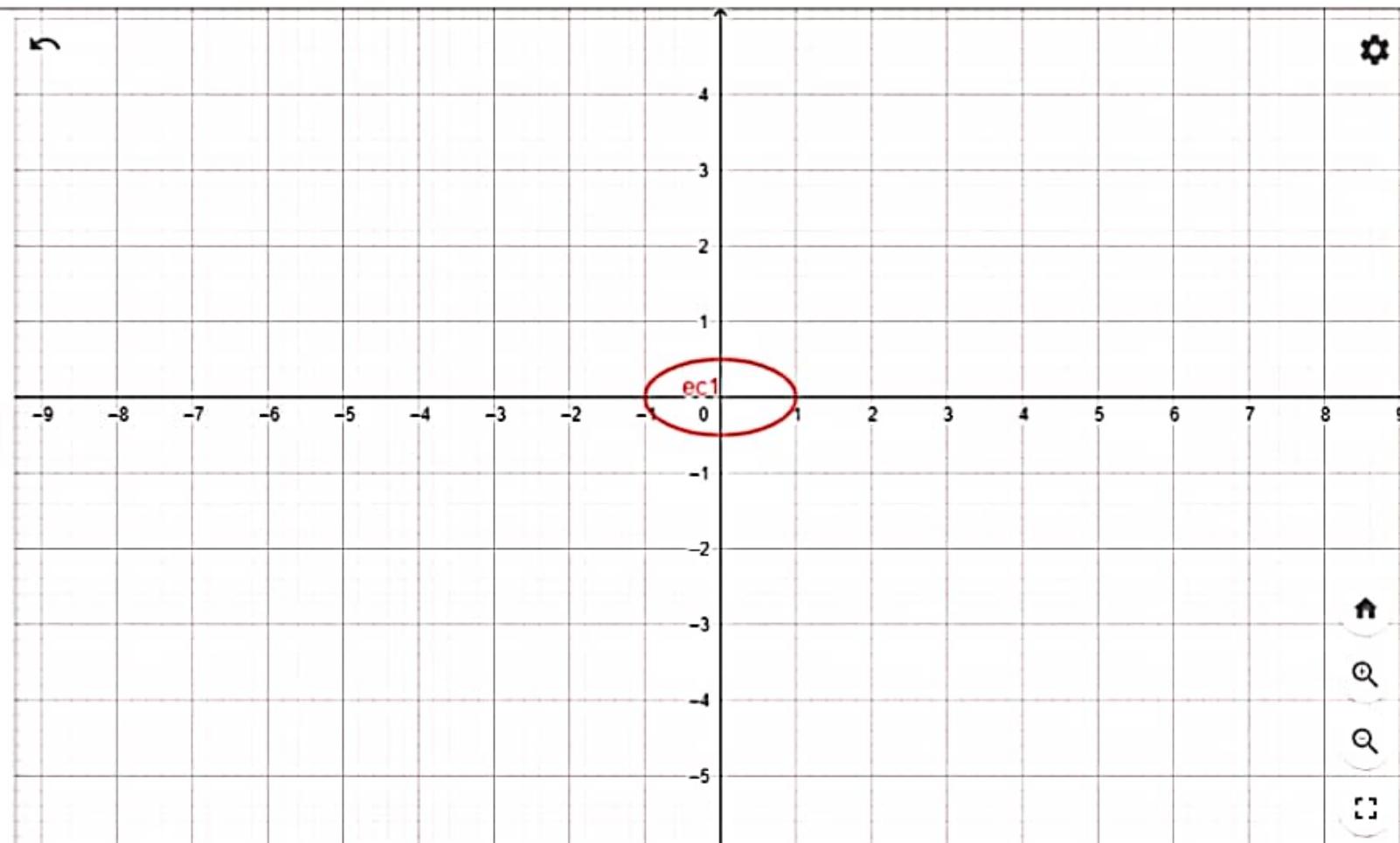
Entrada...

Elementos

Tabla

Suite Calculadora Geogebra

Matrices



$$18. 9x^2 + 4y^2 = 1$$

$$\frac{x^2}{\frac{1}{9}} + \frac{y^2}{\frac{1}{4}} = 1$$

$$V_1(0, \frac{1}{2})$$

Eje mayor:

$$2 \cdot \frac{1}{2} = 1$$

$$\frac{x^2}{\frac{1}{9}} + \frac{y^2}{\frac{1}{4}} = 1$$

$$F_1(0, \frac{\sqrt{51}}{6})$$

Eje menor:

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

$$\sqrt{a^2} = \sqrt{\frac{1}{4}}$$

$$\sqrt{b^2} = \sqrt{\frac{1}{9}}$$

$$a = \frac{1}{2}$$

$$b = \frac{1}{3}$$

$$c = \sqrt{\frac{1}{4} - \frac{1}{9}}$$

$$e = \frac{\sqrt{51}}{6}$$

$$c = \sqrt{\frac{5}{36}} = \frac{\sqrt{5}}{6}$$

$$= \frac{\sqrt{5} \times 2}{6 \times 1} = \frac{2\sqrt{5}}{6} = \frac{\sqrt{5}}{3}$$

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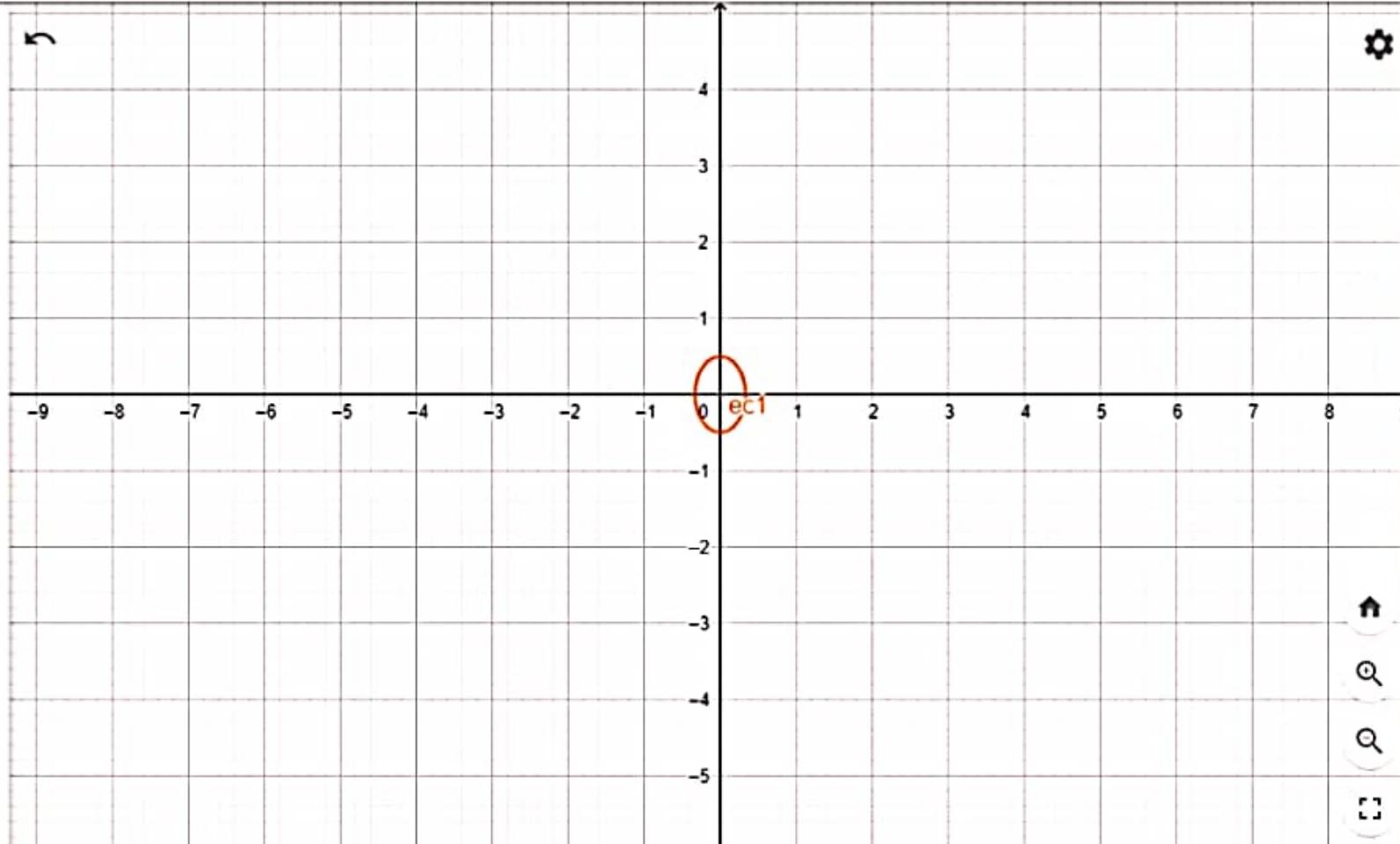
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ec1: $9x^2 + 4y^2 = 1$

Entrada...



Suite Calculadora Geogebra



$$19. \frac{1}{2}x^2 + \frac{1}{8}y^2 = \frac{1}{4}$$

$$\frac{x^2}{\frac{1 \times 4}{2 \times 1}} + \frac{y^2}{\frac{1 \times 4}{8 \times 1}} = \frac{4}{4}$$

$$\frac{x^2}{\frac{4}{2}} + \frac{y^2}{\frac{4}{8}} = 1$$

$$\frac{x^2}{2} + \frac{y^2}{\frac{1}{2}} = 1$$

$$\left| \begin{array}{l} \sqrt{a^2} = \sqrt{2} \\ \sqrt{b^2} = \sqrt{\frac{1}{2}} \end{array} \right.$$

$$a = \sqrt{2}$$

$$b = \frac{\sqrt{2}}{2}$$

$$c = \sqrt{2 - \frac{1}{2}}$$

$$c = \sqrt{\frac{3}{2}} = \frac{\sqrt{6}}{2}$$

$$e = \left[\frac{\frac{\sqrt{6}}{2}}{\sqrt{2}} \right] = \frac{\sqrt{6} \times 1}{2 \times \sqrt{2}} = \frac{\sqrt{6}}{2\sqrt{2}}$$

$$e = \frac{\sqrt{3}}{2}$$

marril

$$V_1(\sqrt{2}, 0)$$

$$V_2(-\sqrt{2}, 0)$$

$$F_1\left(\frac{\sqrt{6}}{2}, 0\right)$$

$$F_2\left(-\frac{\sqrt{6}}{2}, 0\right)$$

$$\text{Eje mayor: } 2 \cdot \sqrt{2} = 2\sqrt{2}$$

$$\text{Eje menor: } 2 \cdot \frac{1}{2} = 1$$



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Calc. Gráfica



ABRIR SESIÓN

ec1: $\frac{1}{2}x^2 + \frac{1}{8}y^2 = 1$

Entrada...

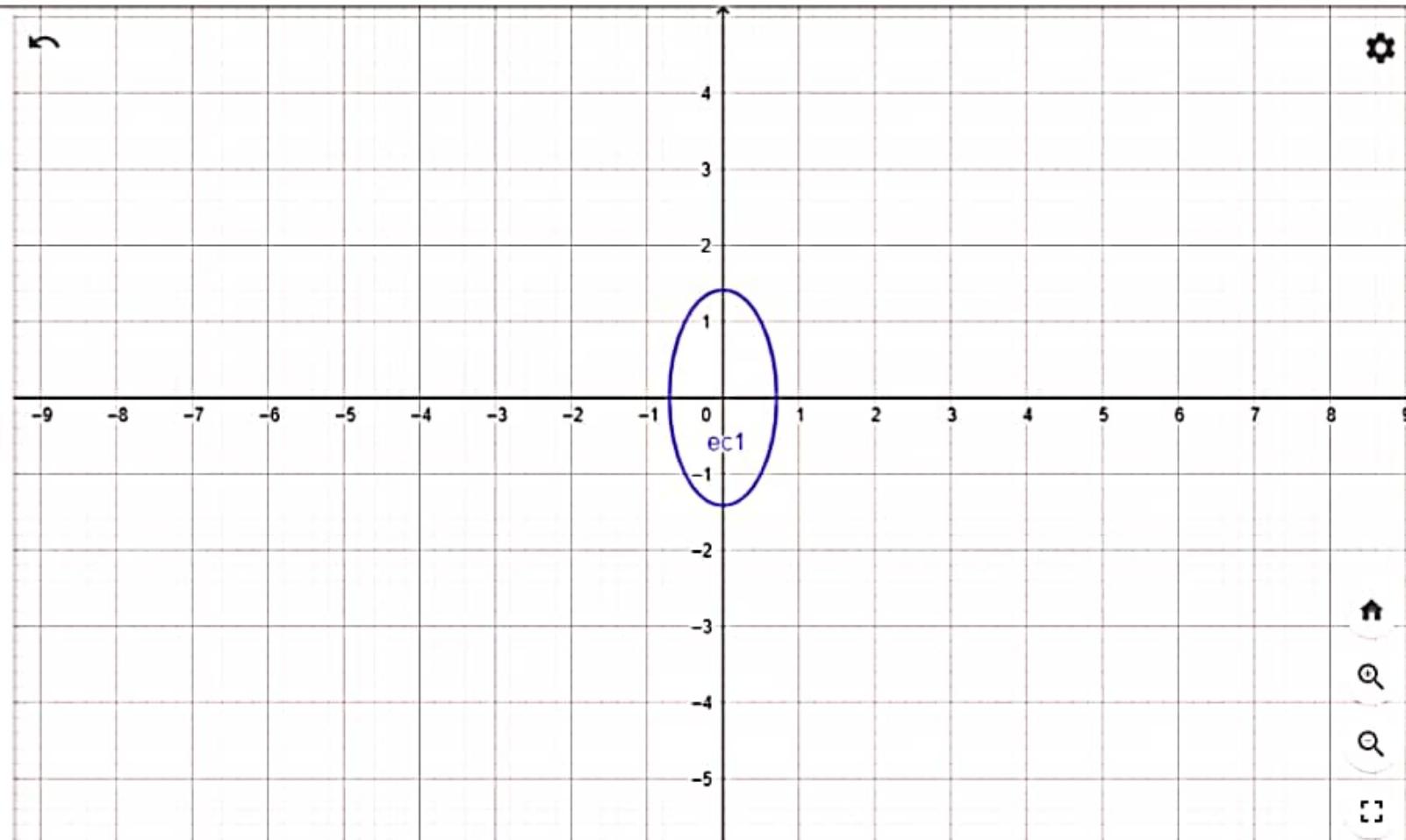


Aparatos



Tabla

Suite Calculadora Geogebra



$$20. \quad x^2 = 4 - 2y^2$$

$$x^2 + 2y^2 = 4$$

$$\frac{x^2}{4} + \frac{y^2}{2} = \frac{4}{4}$$

$$\frac{x^2}{4} + \frac{y^2}{2} = 1$$

$$\sqrt{a^2} = \sqrt{4} \quad \sqrt{b^2} = \sqrt{2}$$

$$a = 2$$

$$b = \sqrt{2}$$

$$c = \sqrt{4 - 2}$$

$$c = \sqrt{2}$$

$$e = \frac{\sqrt{2}}{2}$$

$$V_1(2, 0)$$

$$V_2(-2, 0)$$

$$F_1(\sqrt{2}, 0)$$

$$F_2(-\sqrt{2}, 0)$$

Eje mayor:

$$2 \cdot 2 = 4$$

Eje menor:

$$2 \cdot \sqrt{2} = 2\sqrt{2}$$



GeoGebra Suite Calculadora

Calc. Gráfica



ABRIR SESIÓN

Algebra

ec1: $x^2 = 4 - 2y^2$

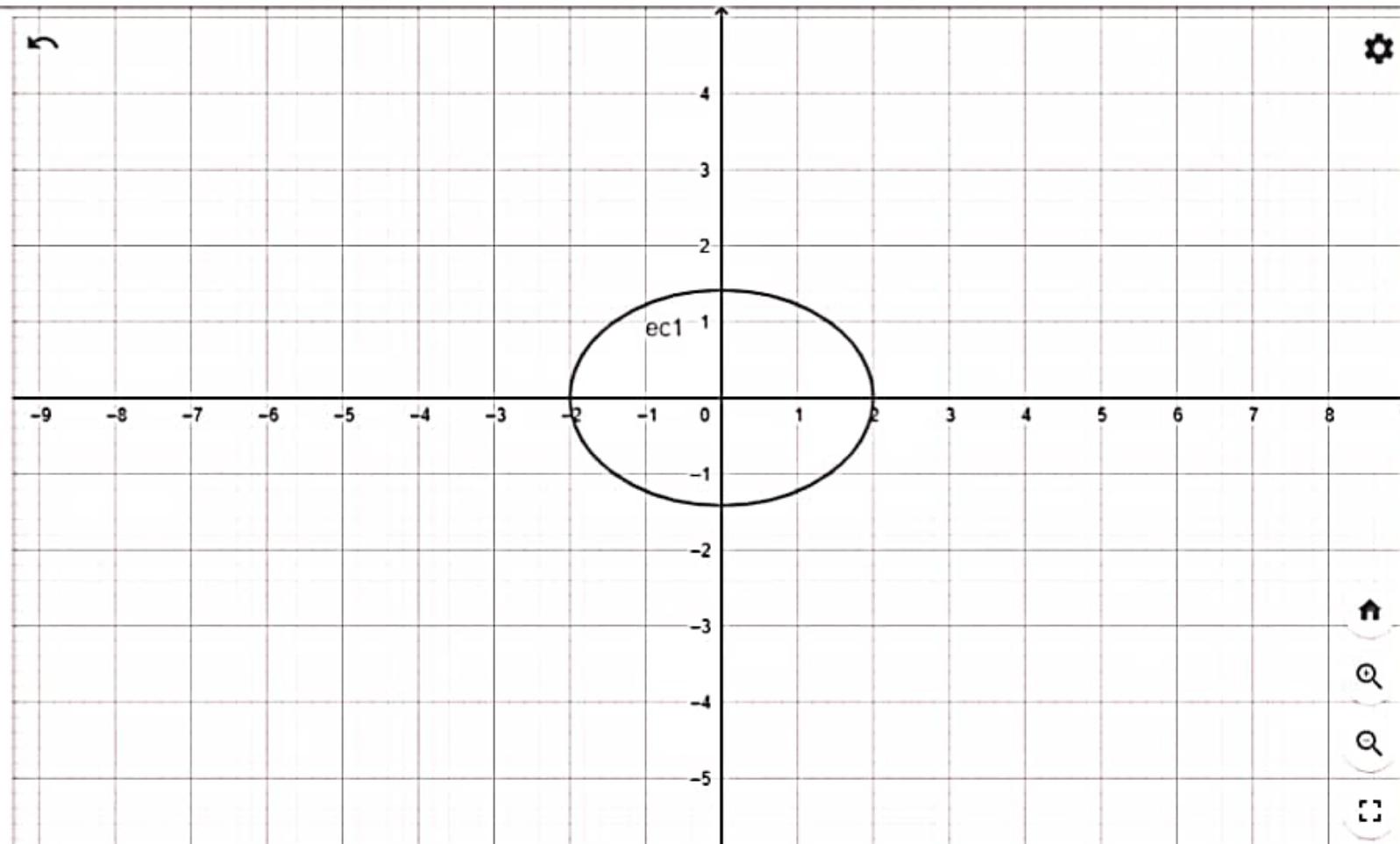
Entrada...

Instrumentos

Tabla

Suite Calculadora Geogebra

Calcular



$$21. y^2 = 1 - 2x^2$$

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

$$\frac{x^2}{\frac{1}{2}} + \frac{y^2}{1} = 1$$

$$\frac{x^2}{\frac{1}{2}} + y^2 = 1$$

$$V_1(0, 1)$$

$$V_2(0, -1)$$

$$F_1(0, \frac{\sqrt{2}}{2})$$

$$F_2(0, -\frac{\sqrt{2}}{2})$$

Eje mayor:

$$2 \cdot 1 = 2$$

Eje menor:

$$2 \cdot \frac{\sqrt{2}}{2} = \sqrt{2}$$

$$\sqrt{a^2} = \sqrt{1}$$

$$a = 1$$

$$\sqrt{b^2} = \sqrt{\frac{1}{2}}$$

$$b = \frac{\sqrt{2}}{2}$$

$$c = \sqrt{1 - \frac{1}{2}}$$

$$c = \sqrt{\frac{1}{2}} = \frac{\sqrt{2}}{2}$$

$$e = \frac{\frac{\sqrt{2}}{2}}{\frac{1}{2}} = \frac{\sqrt{2}}{2}$$

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ABRIR SESIÓN

Álgebra

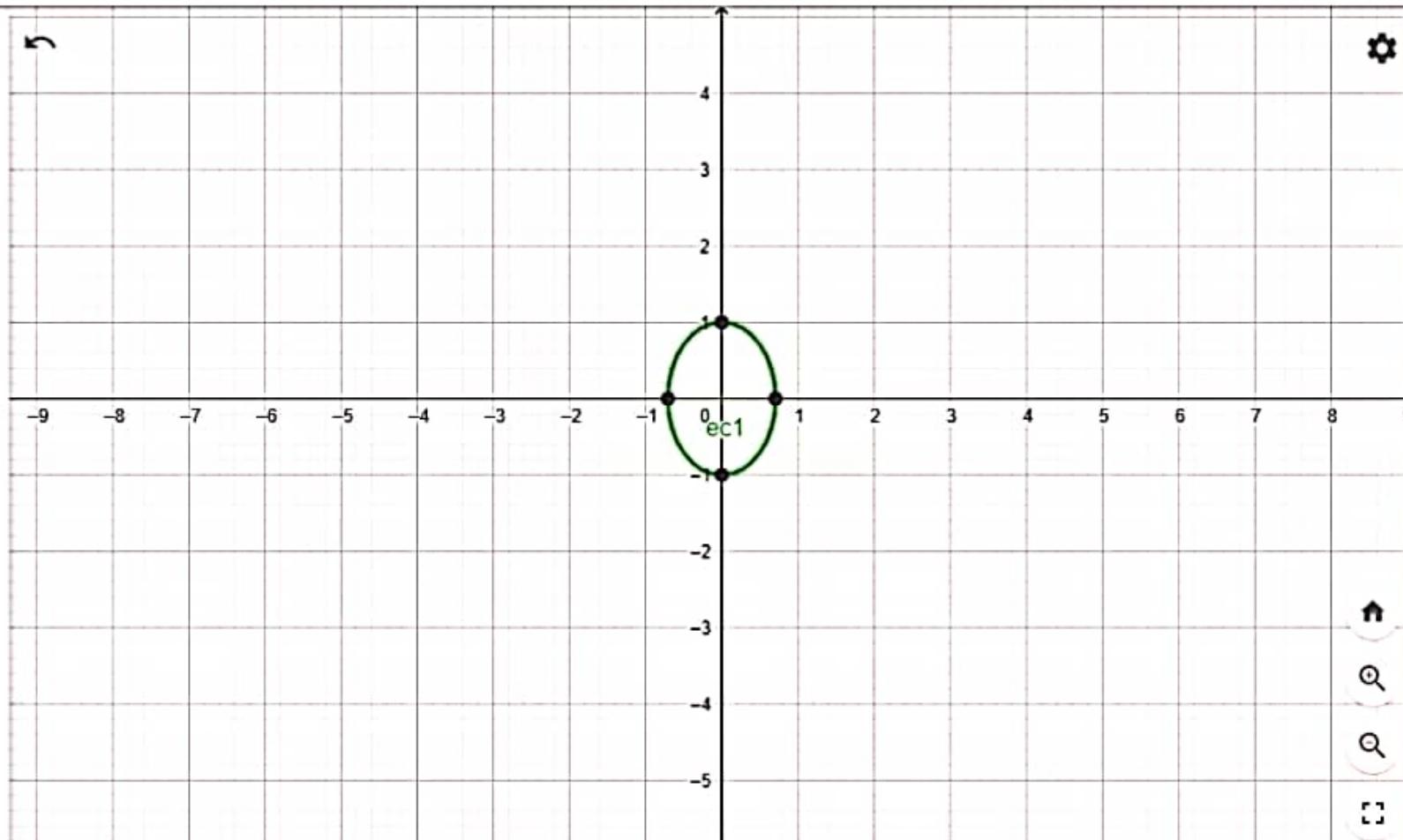
ec1: $y^2 = 1 - 2x^2$

Entrada...

Elementos

Tabla

Suite Calculadora Geogebra



$$22. 20x^2 + 4y^2 = 5$$

$$\frac{x^2}{\frac{5}{20}} + \frac{y^2}{\frac{5}{4}} = \frac{5}{5}$$

$$\frac{x^2}{\frac{1}{4}} + \frac{y^2}{\frac{5}{4}} = 1$$

$$V_1(0, \frac{\sqrt{5}}{2})$$

$$V_2(0, -\frac{\sqrt{5}}{2})$$

Eje mayor:

$$2 \cdot \frac{\sqrt{5}}{2} = \sqrt{5}$$

$$F_1(0, 1)$$

$$F_2(0, -1)$$

Eje menor:

$$2 \cdot \frac{1}{2} = 1$$

$$\sqrt{a^2} = \sqrt{\frac{5}{4}}$$

$$a = \frac{\sqrt{5}}{2}$$

$$\sqrt{b^2} = \sqrt{\frac{1}{4}}$$

$$b = \frac{1}{2}$$

$$c = \sqrt{\frac{5}{4} - \frac{1}{4}}$$

$$c = \sqrt{1} = 1$$

$$e = \frac{\frac{1}{2}}{\frac{\sqrt{5}}{2}} = \frac{1 \times 2}{1 \times \sqrt{5}} = \frac{2\sqrt{5}}{5}$$

GeoGebra Suite Calculadora

Calc. Gráfica

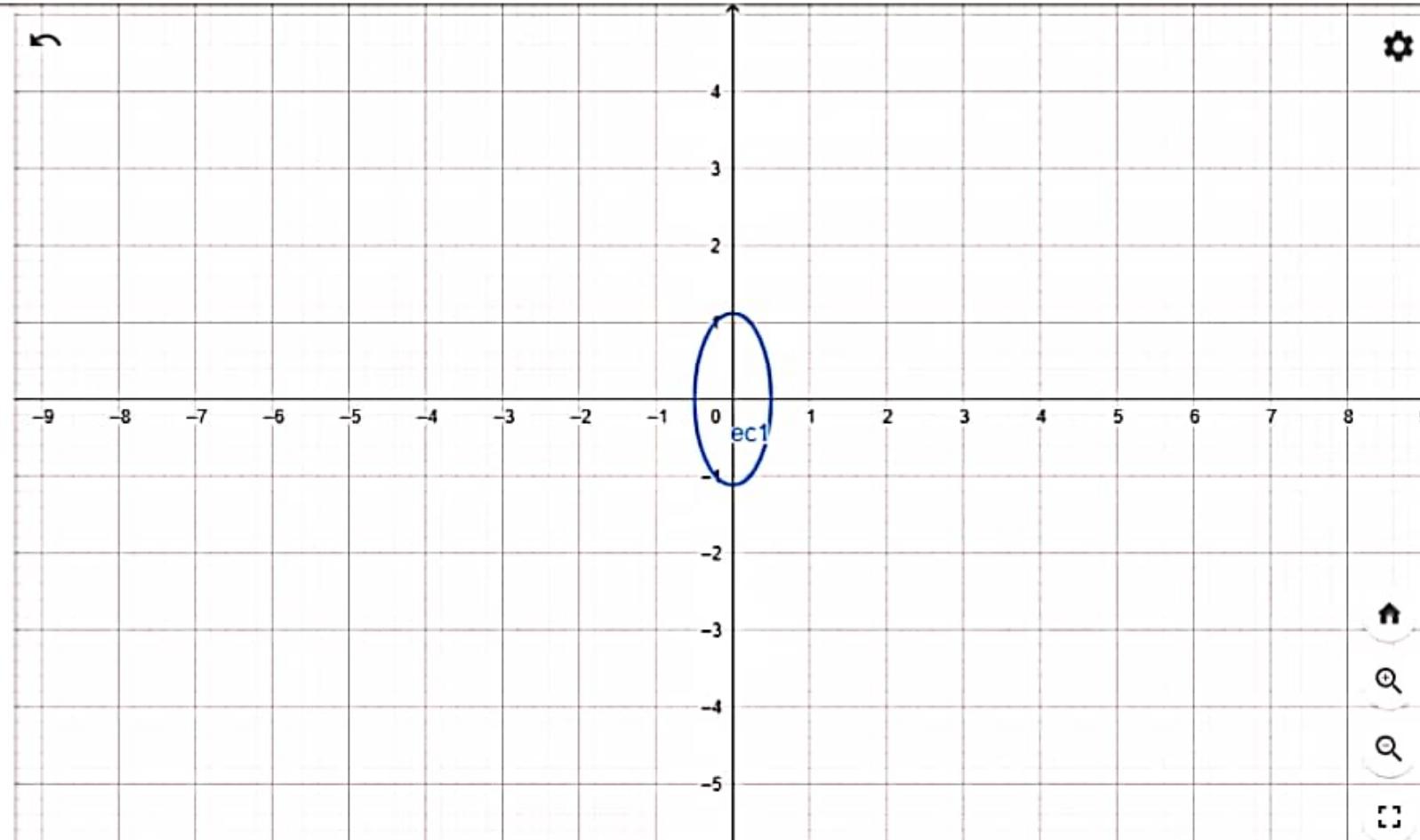


ABRIR SESIÓN

ec1: $20x^2 + 4y^2 = 5$

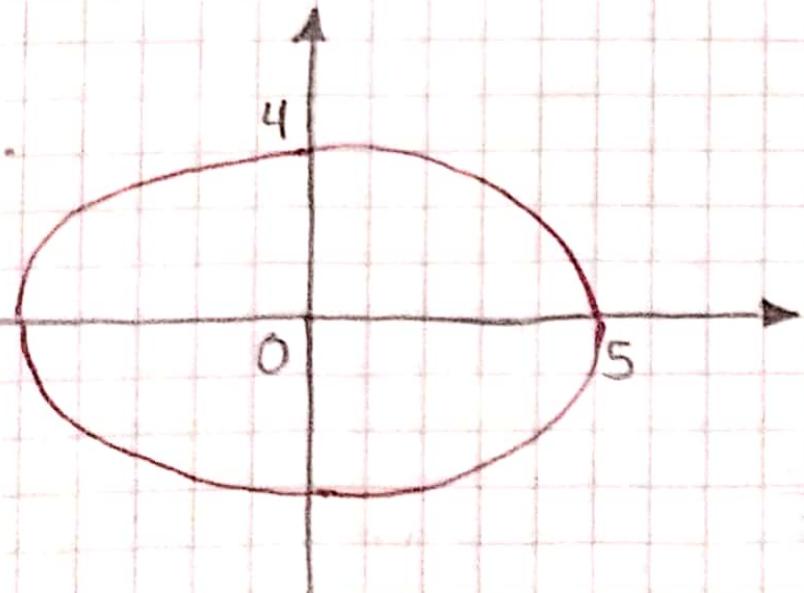


+ Entrada...



23-28 • Encuentra una ecuación para la elipse cuya gráfica
se muestra

23.

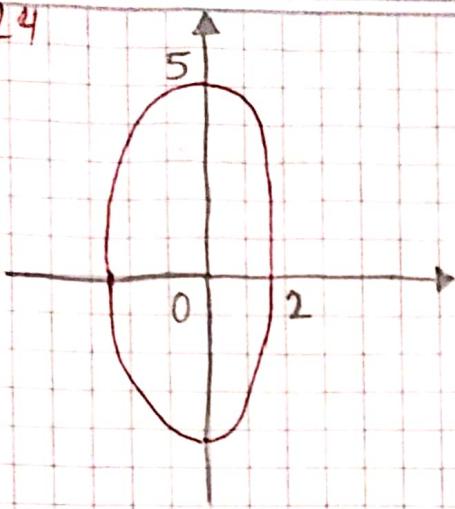


Ecuación:

$$\frac{x^2}{25} + \frac{y^2}{16} = 1$$

marfil

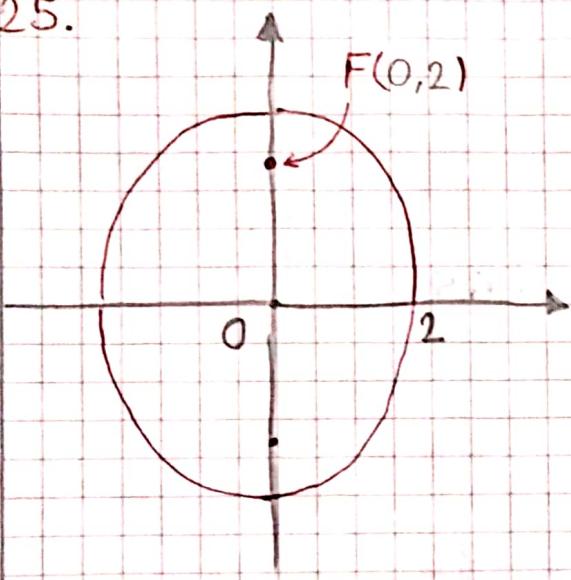
24.



Ecación:

$$\frac{x^2}{4} + \frac{y^2}{25} = 1$$

25.



Ecación:

$$\frac{x^2}{4} + \frac{y^2}{8} = 1$$

$$a^2 = b^2 + c^2$$

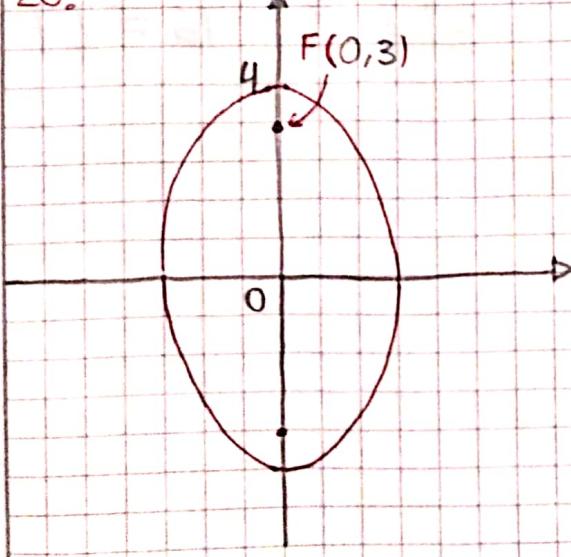
$$a^2 = 2^2 + 2^2$$

$$\sqrt{a^2} = \sqrt{8}$$

$$a = \sqrt{8}$$

$$b = 2$$

26.



Ecación:

$$\frac{x^2}{7} + \frac{y^2}{16} = 1$$

$$b^2 = a^2 - c^2$$

$$b^2 = 4^2 - 3^2$$

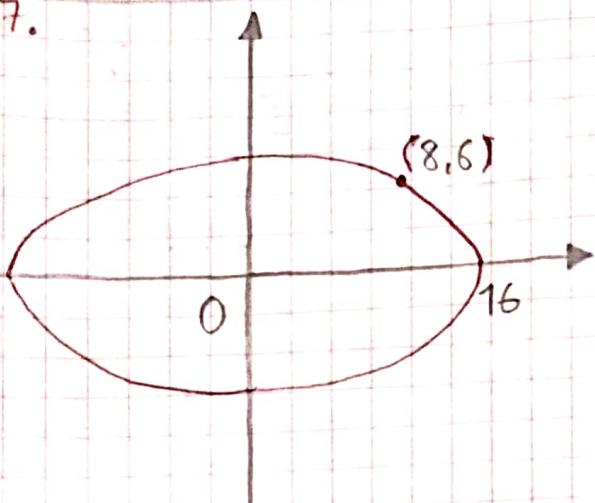
$$\sqrt{b^2} = \sqrt{7}$$

$$b = \sqrt{7}$$

$$a = 4$$

marril

27.



Ecación:

$$\frac{x^2}{256} + \frac{y^2}{27} = 1 \quad x = 8 \\ y = 6 \\ a = 16$$

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

$$\frac{8^2}{16^2} + \frac{6^2}{b^2} = 1$$

$$\frac{64}{256} + \frac{36}{b^2} = 1$$

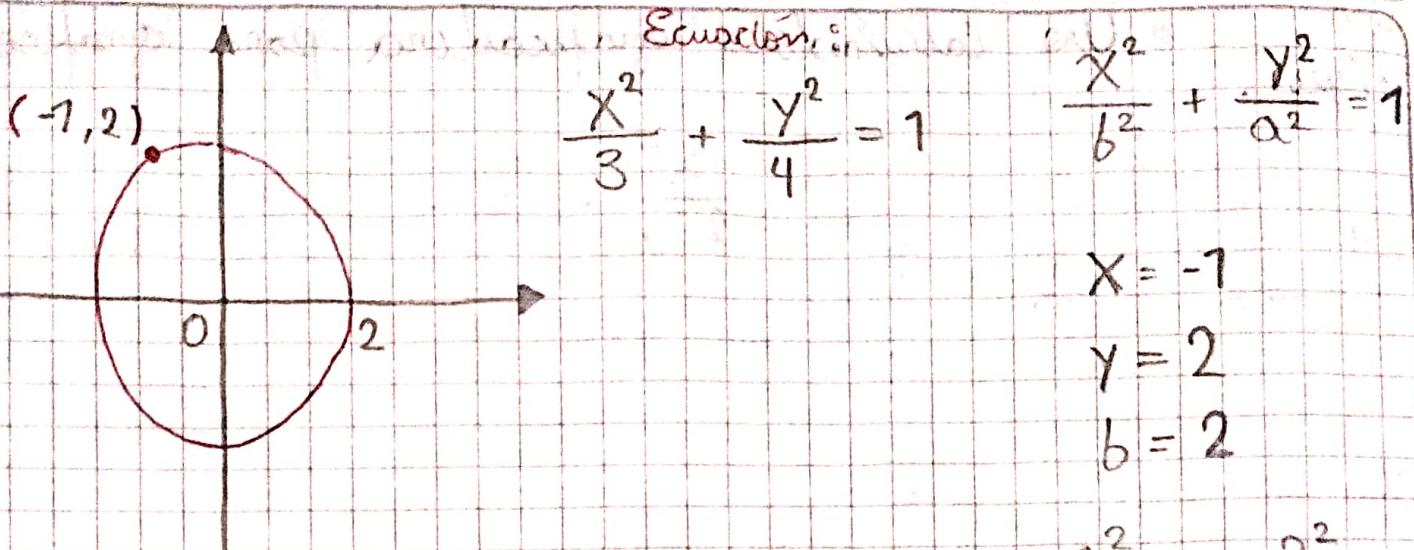
$$\frac{1}{4} + \frac{36}{b^2} = 1$$

$$\frac{36}{b^2} = 1 - \frac{1}{4}$$

$$b^2 = \frac{3}{4} \cdot 36 = 27$$

morfín

28.



$$x = -1$$

$$y = 2$$

$$b = 2$$

$$\frac{-1^2}{2^2} + \frac{2^2}{a^2} = 1$$

$$\frac{1}{4} + \frac{4}{a^2} = 1$$

$$\frac{4}{a^2} = 1 - \frac{1}{4}$$

$$a^2 = \frac{3}{4} \cdot 4 = 3$$

29 - 32 ■ Use calculadora graficadora para graficar la ellipse.

$$29. \frac{x^2}{25} + \frac{y^2}{20} = 1$$

$$30. x^2 + \frac{y^2}{72} = 1$$

$$31. 6x^2 + y^2 = 36$$

$$32. x^2 + 2y^2 = 8$$



-9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9

4

3

2

1

0

-1

-2

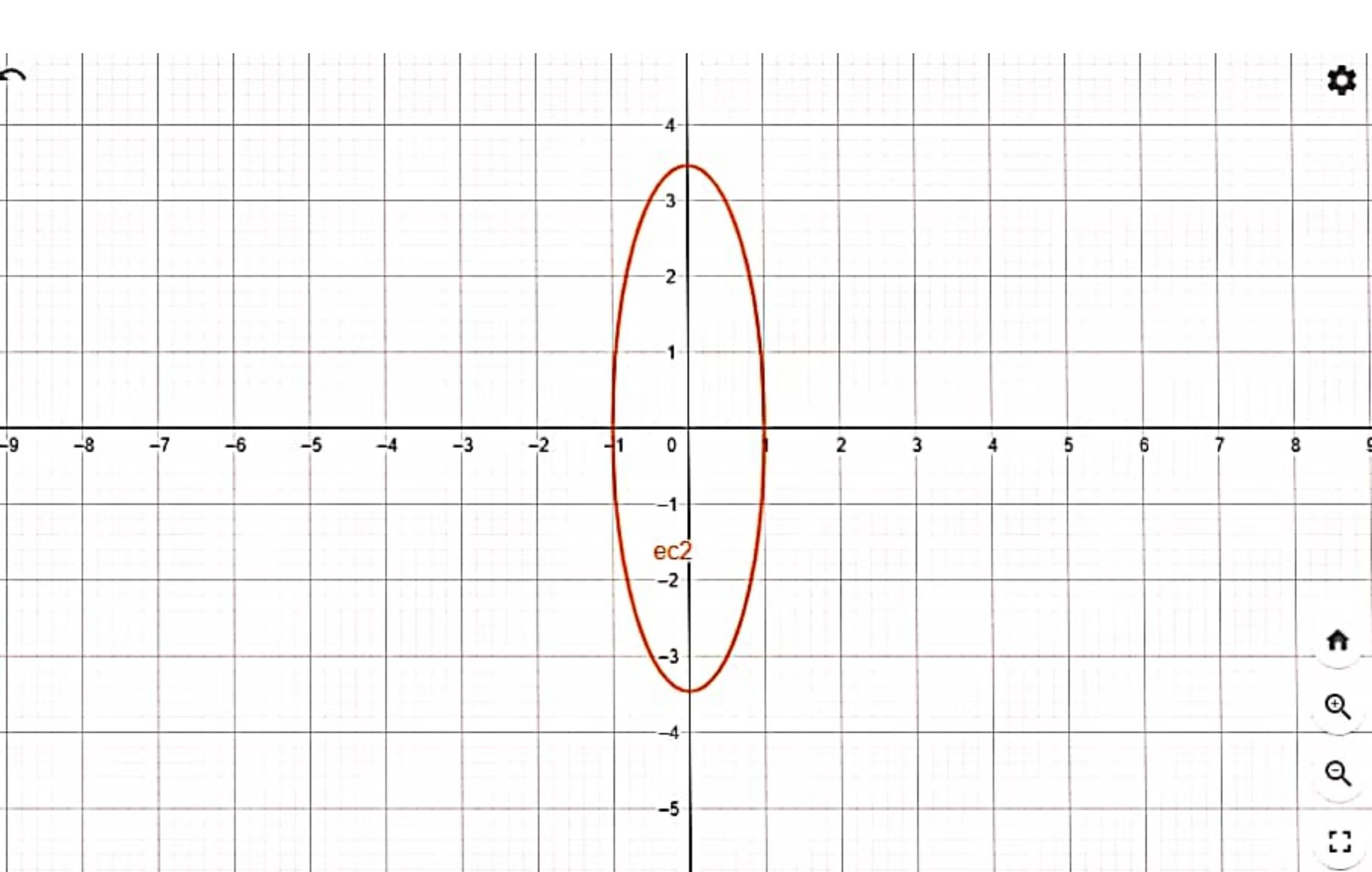
-3

-4

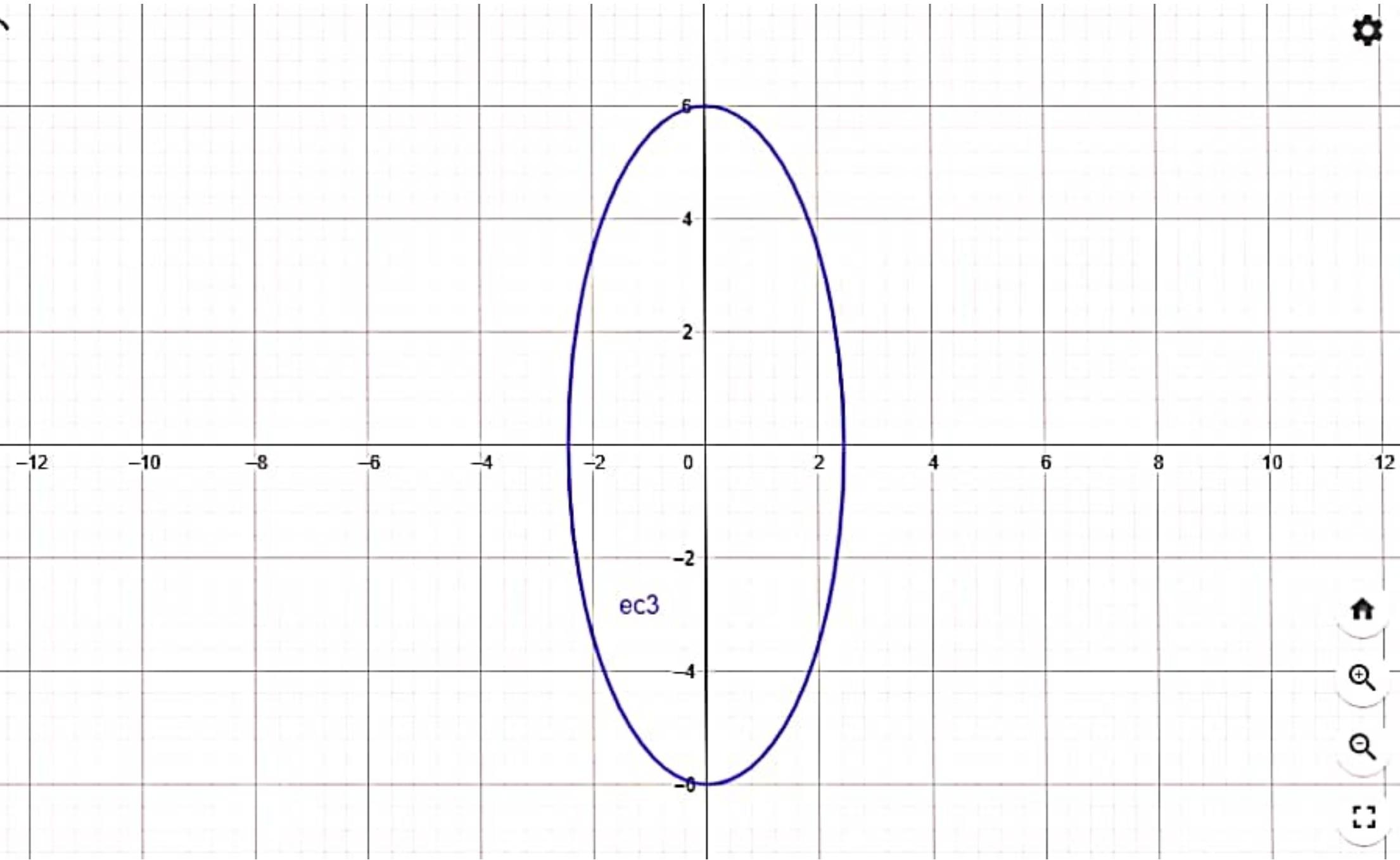
-5

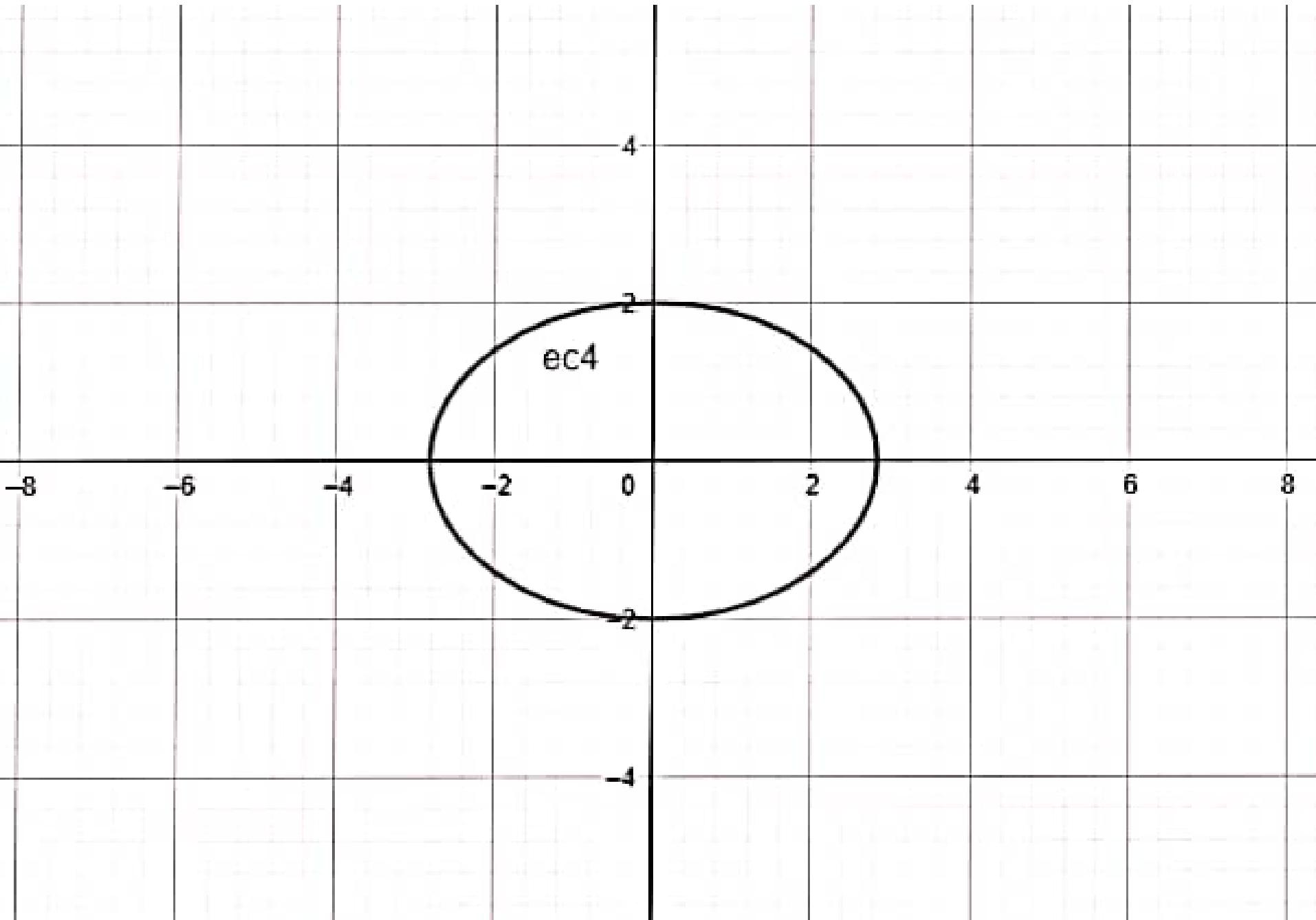


ec1



5





33 - 34 ■ Encuentre una ecuación para la elipse que
satisfaga las condiciones dadas

33. Focos : $(\pm 4, 0)$, Vértices : $(\pm 5, 0)$

$$a = 5$$

$$b = 3$$

$$c = 4$$

$$\sqrt{b^2} = \sqrt{a^2 - c^2}$$

$$b = \sqrt{25 - 16}$$

$$b = \sqrt{9} = 3$$

$$\frac{x^2}{25} + \frac{y^2}{9} = 1$$

morfir

34. foco: $(0, \pm 3)$, vértices: $(0, \pm 5)$

$$a = 5$$

$$b = 4$$

$$c = 3$$

$$\sqrt{b^2} = \sqrt{a^2 - c^2}$$

$$b = \sqrt{25 - 9}$$

$$b = \sqrt{16}$$

$$b = 4$$

$$\frac{x^2}{16} + \frac{y^2}{25} = 1$$

35. Longitud de eje mayor 4, longitud de eje menor 2,
foco en eje y

$$a = \frac{4}{2}$$

$$b = \frac{2}{2}$$

$$a = 2$$

$$b = 1$$

$$a^2 = 4$$

$$b^2 = 1$$

$$\frac{x^2}{4} + \frac{y^2}{1} = 1$$

36. Longitud de eje mayor 6, longitud de eje menor 4,
foco en eje x

$$a = \frac{6}{2}$$

$$b = \frac{4}{2}$$

$$a = 3$$

$$b = 2$$

$$a^2 = 6$$

$$b^2 = 4$$

$$\frac{x^2}{6} + \frac{y^2}{4} = 1$$

37. focos: $(0, \pm 2)$, longitud de eje menor 6

$$a = \sqrt{13}$$

$$b = \frac{6}{2}$$

$$b = 3$$

$$c = 2$$

$$\sqrt{a^2} = \sqrt{b^2 + c^2}$$

$$a = \sqrt{9 + 4}$$

$$a = \sqrt{13}$$

$$\frac{x^2}{9} + \frac{y^2}{13} = 1$$

38. focos $(\pm 5, 0)$, longitud de eje mayor 12

$$a = \frac{12}{2}$$

$$a = 6$$

$$b = \sqrt{11}$$

$$c = 5$$

$$\sqrt{b^2} = \sqrt{a^2 - c^2}$$

$$b = \sqrt{36 - 25}$$

$$b = \sqrt{11}$$

$$\frac{x^2}{36} + \frac{y^2}{11} = 1$$

39. Puntos extremos de eje mayor: $(\pm 10, 0)$, distancia entre focos

2a Eje mayor $\rightarrow 20 \rightarrow 10 = a$

$$\frac{x^2}{100} + \frac{y^2}{91} = 1$$

2b Eje menor $\rightarrow \sqrt{91}$

2c Distancia focal $\rightarrow 6 \rightarrow 3 = c$

$$\sqrt{b^2} = \sqrt{a^2 - c^2}$$

$$b = \sqrt{100 - 9}$$

$$b = \sqrt{91}$$

marril

40. Punto extremo de eje menor $(0, \pm 3)$, distancia entre focos: 8

$$a = 5$$

$$b = 3$$

$$c = 8/2 = 4$$

$$a = \sqrt{b^2 + c^2}^1$$

$$a = \sqrt{9 + 16}^1$$

$$a = \sqrt{25}^1$$

$$a = 5$$

$$\frac{x^2}{25} + \frac{y^2}{9} = 1$$

41. Longitud de eje mayor: 10, foco en eje x, ellipse para por el punto $(\sqrt{5}, 2)$

$$a = \frac{10}{2} = 5$$

$$b = \frac{4\sqrt{5}}{5}$$

$$\frac{x^2}{5} + \frac{y^2}{\frac{16}{5}} = 1$$

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

$$\frac{(\sqrt{5})^2}{5^2} + \frac{2^2}{b^2} = 1$$

$$\frac{5}{25} + \frac{4}{b^2} = 1$$

$$\frac{4}{b^2} = 1 - \frac{5}{25}$$

$$b^2 = \frac{4}{5} \cdot 4 = \frac{16}{5}$$

42. Excentricidad $\frac{1}{9}$, focos: $(0, \pm 2)$. $a = \frac{c}{e}$

$$e = \frac{c}{a} = \frac{1}{9}$$

$$a = \sqrt{\frac{2}{\frac{1}{9}}} = \frac{2 \times 9}{1} = \frac{18}{1} = 18$$

$$c = 2$$

$$a = 18$$

$$b = \sqrt{320}$$

$$a^2 = a^2 - c^2$$

$$b^2 = 18^2 - 2^2$$

$$\sqrt{b^2} = \sqrt{324 - 4}$$

$$b = \sqrt{320}$$

$$\frac{x^2}{320} + \frac{y^2}{324} = 1$$

43. Excentricidad: 0,8, focos: $(\pm 1,5, 0)$

$$a = \frac{15}{8}$$

$$a = \frac{c}{e}$$

$$b = \frac{9}{8}$$

$$a = \sqrt{\frac{3}{2}} = \frac{3 \times 5}{2 \times 4} = \frac{15}{8}$$

$$c = \frac{3}{2}$$

$$e = \frac{4}{5}$$

$$b = \sqrt{\left(\frac{15}{8}\right)^2 - \left(\frac{3}{2}\right)^2}$$

$$\frac{x^2}{225} + \frac{y^2}{81} = 1$$

$$b = \sqrt{\frac{225}{64} - \frac{9}{4}}$$

$$b = \sqrt{\frac{81}{64}}$$

marril

$$b = \frac{9}{8}$$

94. Excentricidad: $\sqrt{3}/2$, foco en eje y, longitud del eje mayor: 4

$$e = \frac{\sqrt{3}}{2}$$

$$a = 2$$

$$b = 1$$

$$c = \sqrt{3}$$

$$a = \frac{c}{e}$$

$$a = \frac{\sqrt{3}}{\frac{1}{\frac{\sqrt{3}}{2}}} = \frac{\sqrt{3} \times 2}{1 \times \sqrt{3}} = \frac{2\sqrt{3}}{\sqrt{3}}$$

$$a = 2$$

$$\frac{x^2}{4} + \frac{y^2}{1} = 1$$

$$b = \sqrt{a^2 - c^2}$$

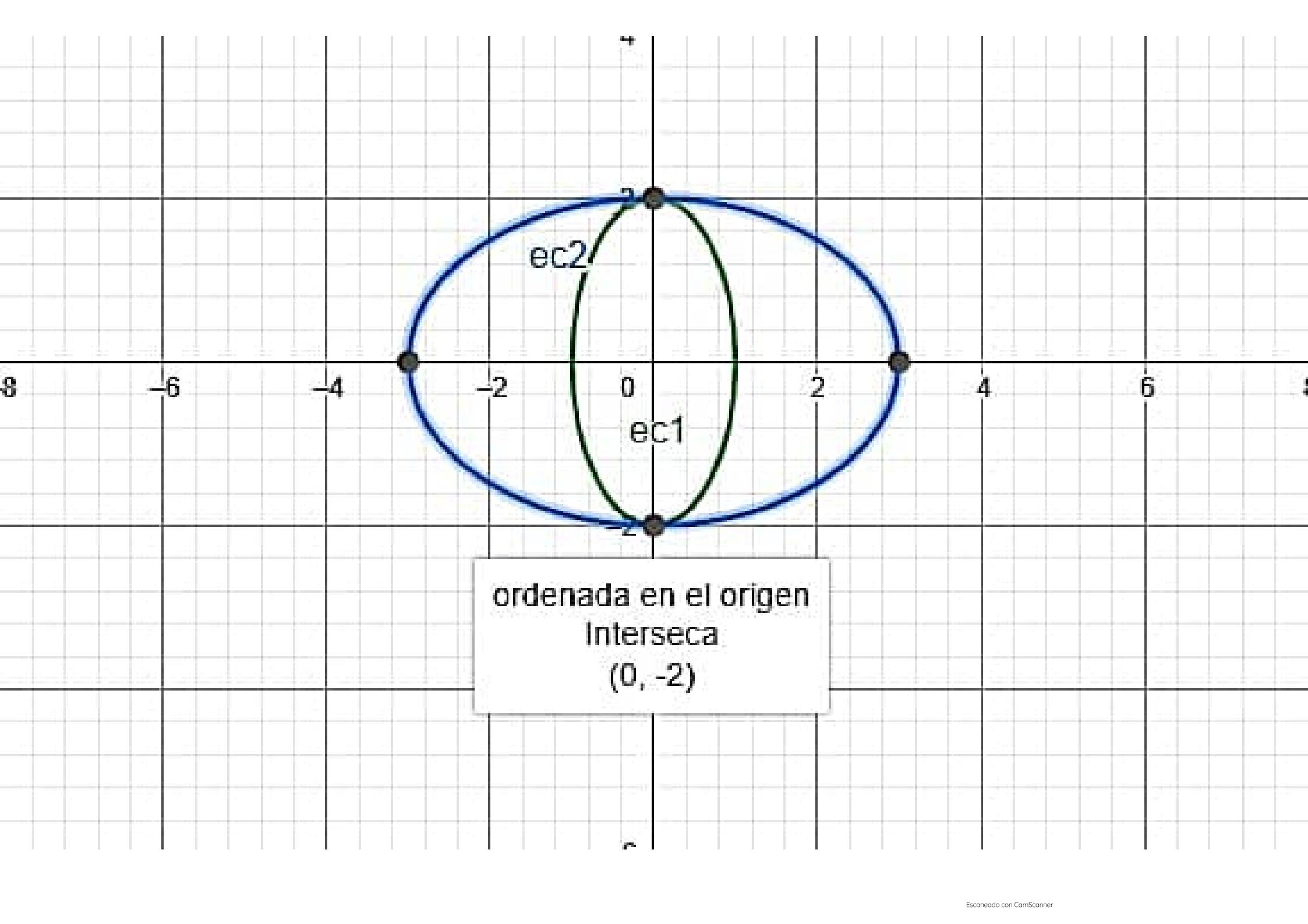
$$b = \sqrt{4 - 3}$$

$$b = \sqrt{1}$$

$$b = 1$$

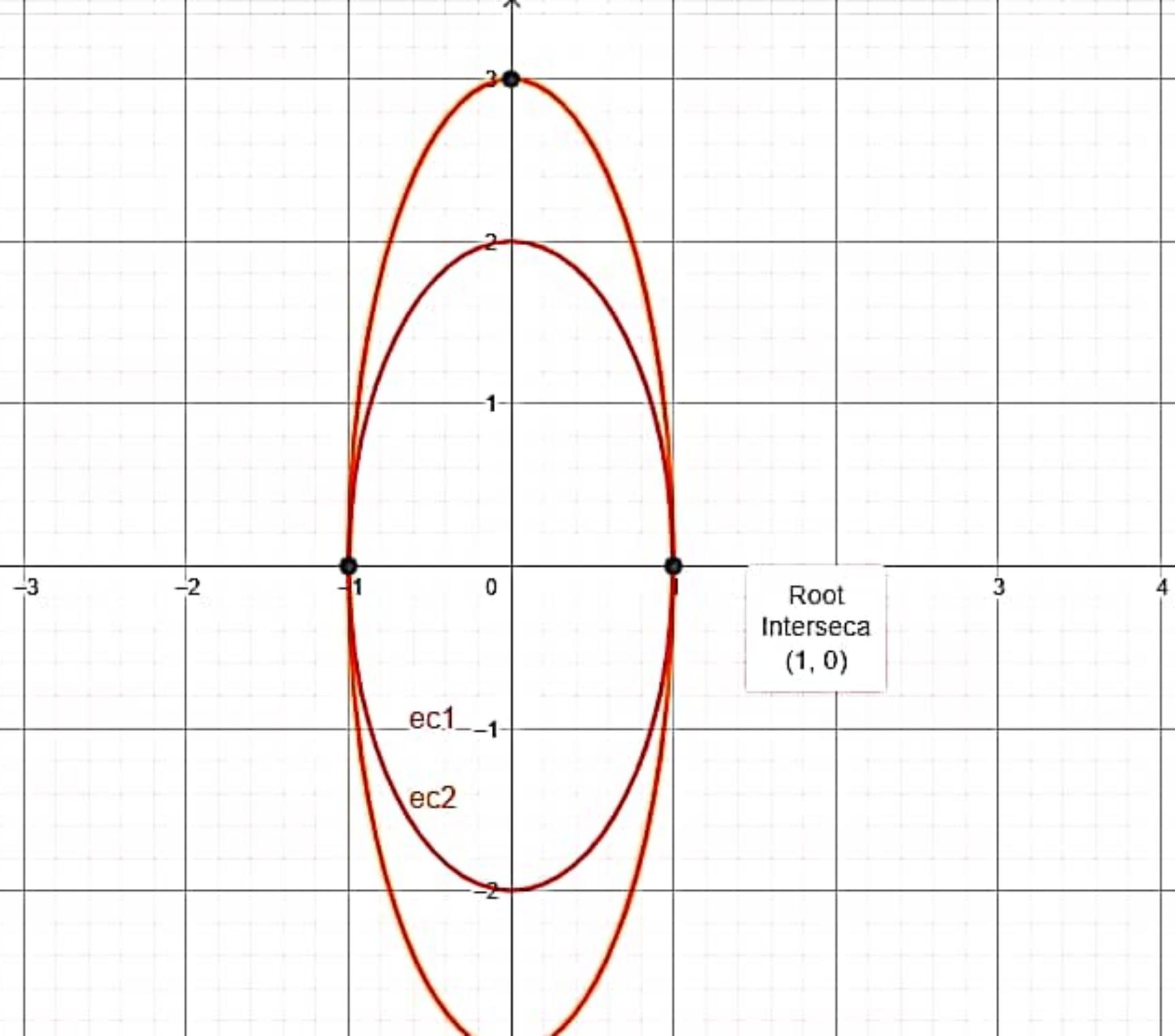
~~45 - 47~~ ■ Encuentre los puntos de intersección del par de elipses

45.
$$\begin{cases} 4x^2 + y^2 = 4 \\ 4x^2 + 9y^2 = 36 \end{cases}$$



46.
$$\begin{cases} 100x^2 + 25y^2 = 100 \\ x^2 + \frac{y^2}{9} = 1 \end{cases}$$

5



47.

$$\left\{ \begin{array}{l} \frac{x^2}{16} + \frac{y^2}{9} = 1 \\ \frac{x^2}{9} + \frac{y^2}{16} = 1 \end{array} \right.$$

