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Avaliação II

1) Determine uma relação entre x e y, sabendo que $x = 5\,\text{sen}\,t$ e $y = 7\cos t$, independente de t.

$$x = 5\,\text{sen}\,t \rightarrow \text{sen}\,t = \frac{x}{5}$$
$$y = 7\cos t$$
$$\rightarrow \cos t = \frac{y}{7}$$

$$\text{sen}^2 t + \cos^2 t = 1$$

$$\left(\frac{x}{5}\right)^2 + \left(\frac{y}{7}\right)^2 = 1 \rightarrow \frac{x^2}{25} + \frac{y^2}{49} = 1$$

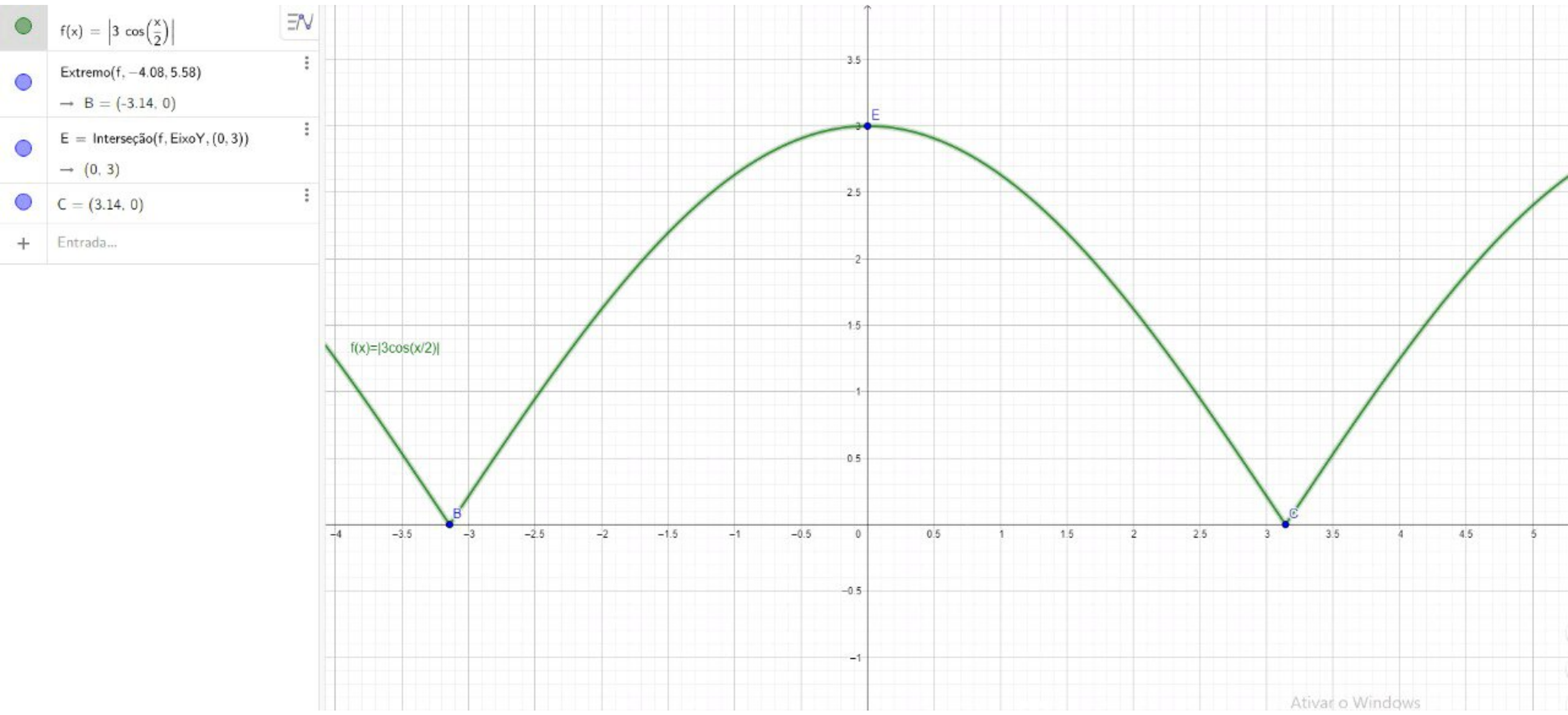
$$\frac{49x^2 + 25y^2}{1225} = 1 \rightarrow 49x^2 + 25y^2 = 1225$$

2) Construa o gráfico e dê o domínio e a imagem da função $f(x) = \left|3\cos\left(\frac{x}{2}\right)\right|$.

$$f(x) = \left|3\cos\left(\frac{x}{2}\right)\right|$$

$$D(f) = \{x \in \mathbb{R} \mid x = \mathbb{R}\}$$

$$Img(f) = \{y \in \mathbb{R} \mid 0 \leq y \leq 3\}$$



f(x) = |3 cos(x/2)|
Extremo(f, −4.08, 5.58)
→ B = (-3.14, 0)
E = Interseção(f, EixoY, (0, 3))
→ (0, 3)
C = (3.14, 0)
Entrada...
f(x)=|3cos(x/2)|
E
B
C
Ativar o Windows

3) Mostre que os polinômios $f(x) = (x^2 - 3x + x)(x^2 + 3x - x)$ e $g(x) = x^4 - 4x^2$ são iguais.

$$(x^2 - 2x) \cdot (x^2 + 2x) = x^4 - 4x^2$$

$$x^4 - 4x^2 = x^4 - 4x^2$$

4) Escalone e resolva o sistema:

$$\begin{cases} 5x - 2y + 3z = 2 \\ 3x + y + 4z = -1 \\ 4x - 3y + z = 3 \end{cases}$$

$$\Downarrow$$

$$\begin{cases} 4x - 3y + z = 3 \\ 7y + 7z = -7 \\ 13y + 13z = -13 \end{cases}$$

$L_1 + L_3$

$$\begin{array}{r} (4) \\ (-5) \end{array}\begin{cases} \cancel{20x} - 8y + 12z = 8 \\ \cancel{-20x} + 15y - 5z = -15 \end{cases}$$

$$7y + 7z = -7$$

$L_2 + L_3$

$$\begin{array}{r} (4) \\ (-3) \end{array}\begin{cases} \cancel{12x} + 4y + 16z = -4 \\ \cancel{-12x} + 9y - 3z = -9 \end{cases}$$

$$13y + 13z = -13$$

$$\begin{array}{r} (13) \\ (-7) \end{array}\begin{cases} \cancel{91y} + 91z = -91 \\ \cancel{-91y} - 91z = 91 \end{cases}$$

$$0$$

$$\begin{cases} 4x - 3y + z = 3 \\ 7y + 7z = -7 \\ \end{cases}$$

$$\boxed{z = 0}$$

$$\rightarrow 7y + \cancel{7z}^{=0} = -7$$

$$y = \frac{-7}{7} \Rightarrow \boxed{y = -1}$$

$$\rightarrow 4x - (3 \cdot -1) = 3$$

$$x = \frac{3-3}{4} \rightarrow \boxed{x = 0}$$

$S: (0, -1, 0)$

5) Dada a Matriz $A=\begin{bmatrix}1 & 5\\ 3 & 2\end{bmatrix}$. Encontre o determinante de $(A^{-1})^2$.

$a+5c=1$

$a+5\cdot\frac{3}{13}=1$

$a+\frac{15}{13}=1$

$a=1-\frac{15}{13}$

$a=\frac{13-15}{13}$

$a=-\frac{2}{13}$,,

$b+5d=0 \quad .(-3)$

$3b+2d=1$

$\cancel{-3b}-15d=0$

$\cancel{3b}+2d=1$

$-13d=1$

$d=\frac{1}{-13}$,,

$b+5\cdot\left(-\frac{1}{13}\right)=0$

$b-\frac{5}{13}=0 \rightarrow b=\frac{5}{13}$,,

$a+5c=1 \quad .(-3)$

$3a+2c=0$

$\cancel{-3a}-15c=-3$

$\cancel{3a}+2c$

$-13c=-3$

$c=\frac{-3}{-13}$

$c=\frac{3}{13}$,,

$A=\begin{bmatrix}1 & 5\\ 3 & 2\end{bmatrix}\cdot\begin{bmatrix}a & b\\ c & d\end{bmatrix}=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$

$A=\begin{bmatrix}a+5c & b+5d\\ 3a+2c & 3b+2d\end{bmatrix}=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$ $\quad A^{-1}=\begin{bmatrix}-2/13 & 5/13\\ 3/13 & 1/-13\end{bmatrix}$

$(A^{-1})^2=\begin{bmatrix}\frac{-2}{13} & \frac{5}{13}\\ \frac{3}{13} & \frac{-1}{13}\end{bmatrix}\cdot\begin{bmatrix}\frac{-2}{13} & \frac{5}{13}\\ \frac{3}{13} & \frac{-1}{13}\end{bmatrix}$

$\begin{bmatrix}\frac{-2}{13}\cdot\left(\frac{-2}{13}\right)+\frac{5}{13}\cdot\frac{3}{13} & \frac{-2}{13}\cdot\frac{5}{13}+\frac{5}{13}\cdot\left(\frac{-1}{13}\right)\\ \frac{3}{13}\cdot\left(\frac{-2}{13}\right)+\left(-\frac{1}{13}\right)\cdot\left(\frac{3}{13}\right) & \frac{3}{13}\cdot\frac{5}{13}+\left(-\frac{1}{13}\right)\cdot\left(\frac{-1}{13}\right)\end{bmatrix}$

$\begin{bmatrix}\frac{4}{169}+\frac{15}{169} & -\frac{10}{169}+\left(-\frac{5}{169}\right)\\ \frac{-6}{169}+\left(-\frac{3}{169}\right) & \frac{15}{169}+\frac{1}{169}\end{bmatrix}$

$(A^{-1})^2=\begin{bmatrix}\frac{19}{169} & \frac{-15}{169}\\ \frac{-9}{169} & \frac{16}{169}\end{bmatrix}$

secundária $\quad$ d. principal

$\det(A^{-1})^2=\left(\frac{19}{169}\cdot\frac{16}{169}\right)-\left(\frac{-15}{169}\cdot\left(-\frac{9}{169}\right)\right)$

$\det(A^{-1})^2=\frac{304}{28.561}-\left(+\frac{135}{28.561}\right)=$

$\frac{304}{28.561}-\frac{135}{28.561}=\frac{169}{28.561}$,,