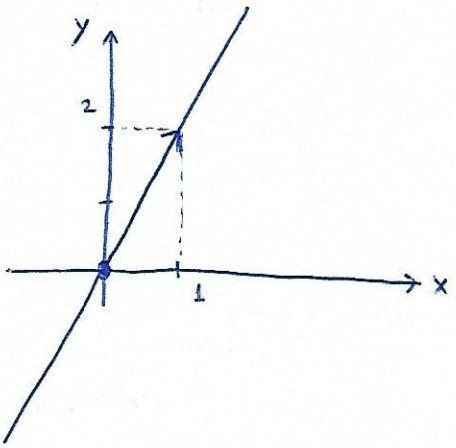
# LISTA 3

## 1

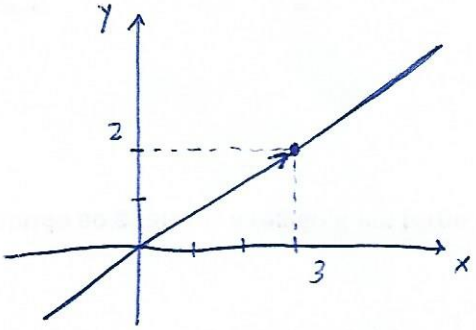
**(a)** $\sigma(t) = (t, 2t),\ t \in \mathbb{R}$ $\rightarrow$ $\sigma(t) = (0,0) + t(1,2),\ t \in \mathbb{R}$

$$\begin{cases} x = t \\ y = 2t \end{cases} \rightarrow \boxed{y = 2x}$$



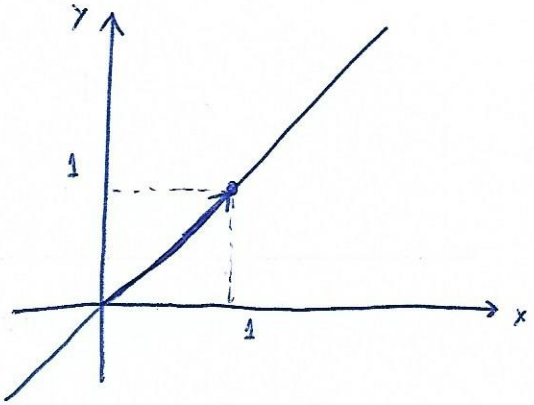

**(b)** $\sigma(t) = (3t, 2t),\ t \in \mathbb{R}$ $\rightarrow$ $\sigma(t) = (0,0) + t(3,2),\ t \in \mathbb{R}$

$$\begin{cases} x = 3t \\ y = 2t \end{cases} \rightarrow \boxed{y = \frac{2}{3}x}$$




**(c)** $\sigma(t) = (2t, 2t),\ t \in \mathbb{R}$ $\rightarrow$ $\sigma(t) = (0,0) + t(2,2),\ t \in \mathbb{R}$

$$\begin{cases} x = 2t \\ y = 2t \end{cases} \rightarrow \boxed{y = x}$$



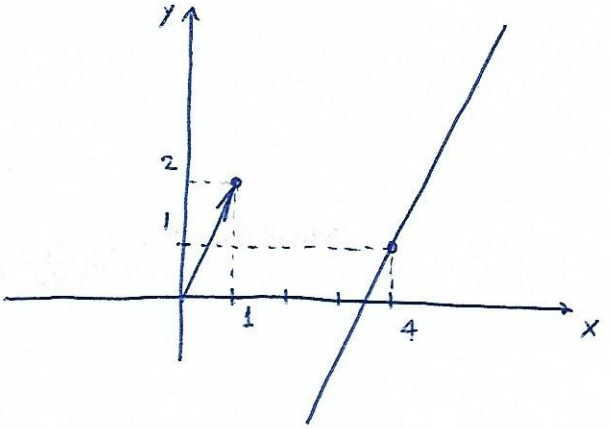
(d) $\sigma(t) = (t+4, 2t+1)$, $t \in \mathbb{R}$ → $\sigma(t) = (4,1) + t(1,2)$, $t \in \mathbb{R}$

$$\begin{cases} x = t+4 \rightarrow t = x-4 \\ y = 2t-1 \end{cases}$$

$$y = 2(x-4)-1$$

$$y = 2x-8-1$$

$$\boxed{y = 2x-9}$$

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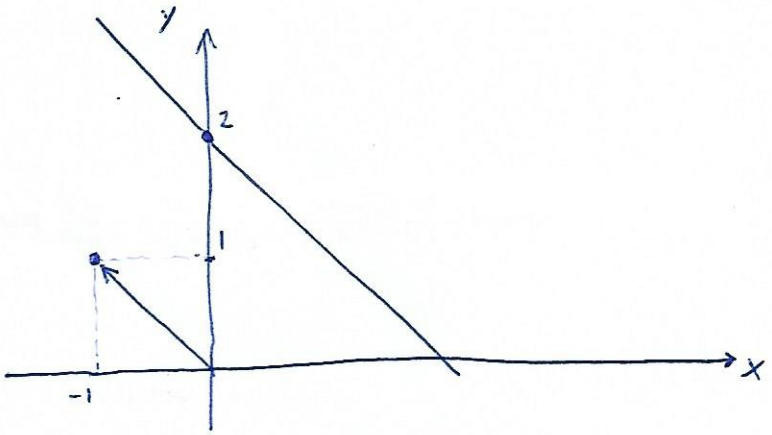
(e) $\sigma(t) = (-t, 2+t)$, $t \in \mathbb{R}$ → $\sigma(t) = (0,2) + t(-1,1)$, $t \in \mathbb{R}$

$$\begin{cases} x = -t \rightarrow t = -x \\ y = 2+t \end{cases}$$

$$\boxed{y = -x+2}$$

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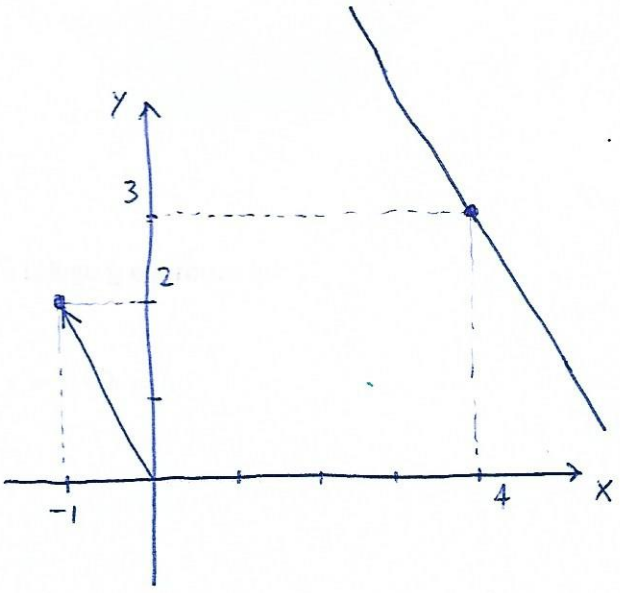
(f) $\sigma(t) = (4-t, 2t+3)$, $t \in \mathbb{R}$ → $\sigma(t) = (4,3) + t(-1,2)$, $t \in \mathbb{R}$

$$\begin{cases} x = 4-t \rightarrow t = 4-x \\ y = 2t+3 \end{cases}$$

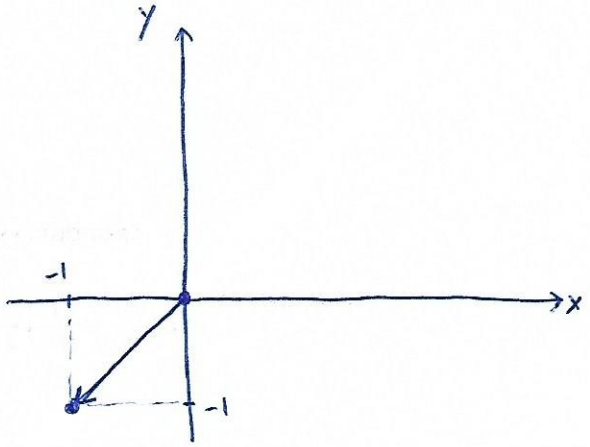
$$y = 2(4-x)+3$$

$$\boxed{y = -2x+11}$$



(g) $\sigma(t) = (-t, -t), t \in [0,1]$ → $\sigma(t) = (0,0) + t(-1,-1), t \in [0,1]$

$$\begin{cases} x = -t \\ y = -t \end{cases} \rightarrow \boxed{y = x, \; x \in [-1,0]}$$

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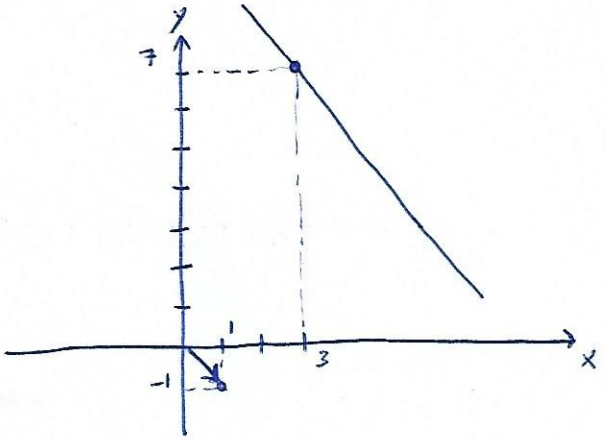
(h) $\sigma(t) = (t+3, -t+7), t \in \mathbb{R}$ → $\sigma(t) = (3,7) + t(1,-1), t \in \mathbb{R}$

$$\begin{cases} x = t+3 \rightarrow t = x-3 \\ y = -t+7 \end{cases}$$

$$\hookrightarrow y = -(x-3) + 7$$

$$\boxed{y = -x + 10}$$

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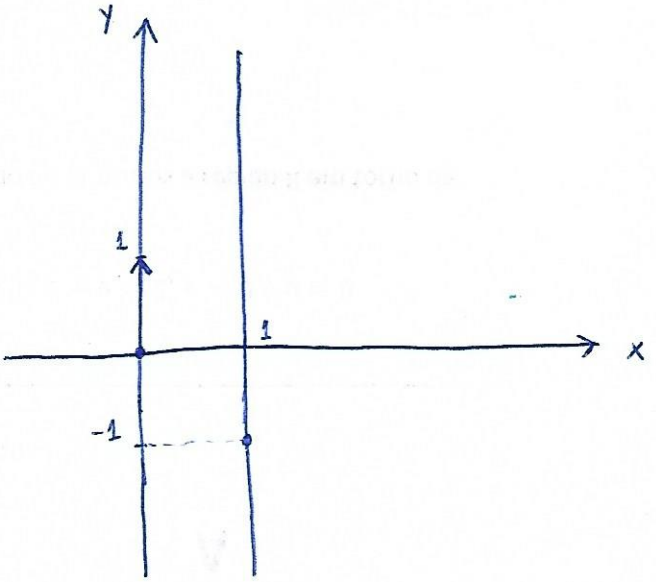
(i) $\sigma(t) = (1, t-1), t \in \mathbb{R}$ → $\sigma(t) = (1,-1) + t(0,1), t \in \mathbb{R}$

$$\begin{cases} x = 1 \\ y = t-1 \end{cases}$$

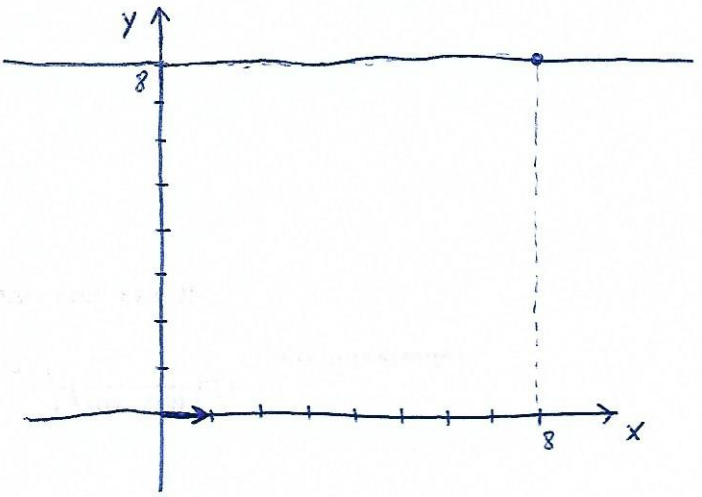
$$\boxed{x = 1}$$



(j) $\sigma(t) = (t+8, 8)$, $t \in \mathbb{R}$ → $\sigma(t) = (8,8) + t(1,0)$, $t \in \mathbb{R}$

$$\begin{cases} x = t+8 \\ y = 8 \end{cases}$$

$\boxed{y = 8}$

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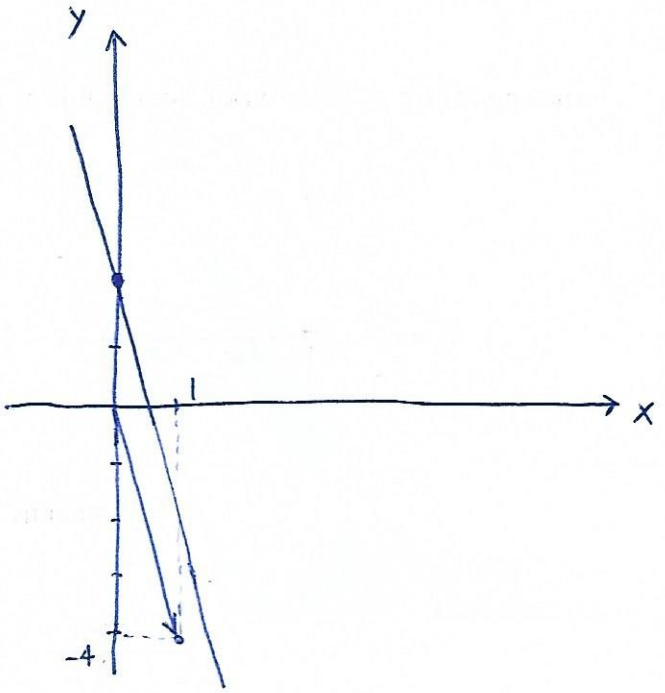
(k) $\sigma(t) = (t, 2-4t)$, $t \in \mathbb{R}$ → $\sigma(t) = (0,2) + t(1,-4)$, $t \in \mathbb{R}$

$$\begin{cases} x = t \\ y = 2-4t \end{cases} \rightarrow \boxed{y = 2-4x}$$

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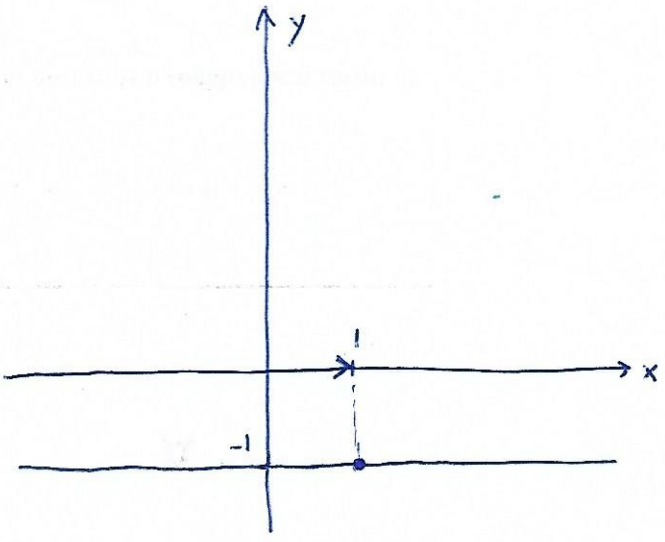
(l) $\sigma(t) = (t+1, -1)$, $t \in \mathbb{R}$ → $\sigma(t) = (1,-1) + t(1,0)$, $t \in \mathbb{R}$

$$\begin{cases} x = t+1 \\ y = -1 \end{cases}$$

$\boxed{y = -1}$

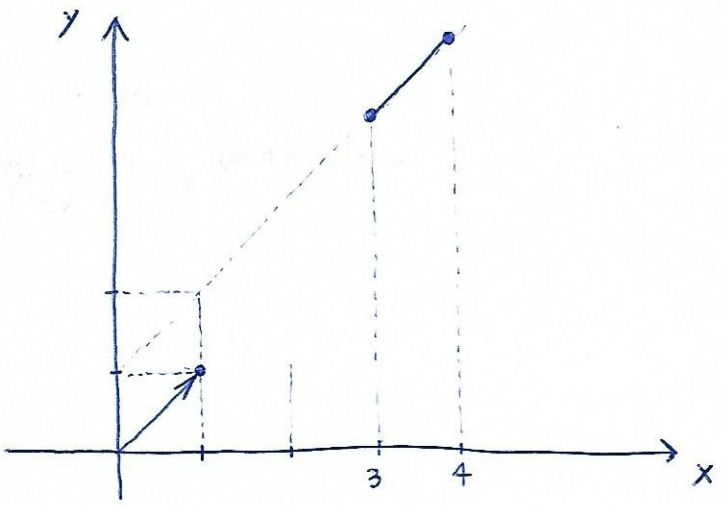


(m) $\sigma(t) = (t+1, t+2), t \in [2,3] \rightarrow \sigma(t) = (1,2) + t(1,1), t \in [2,3]$

$\begin{cases} x = t+1 \rightarrow t = x-1 \\ y = t+2 \end{cases}$

$\hookrightarrow y = x-1+2$

$y = x+1,$
$x \in [3,4]$

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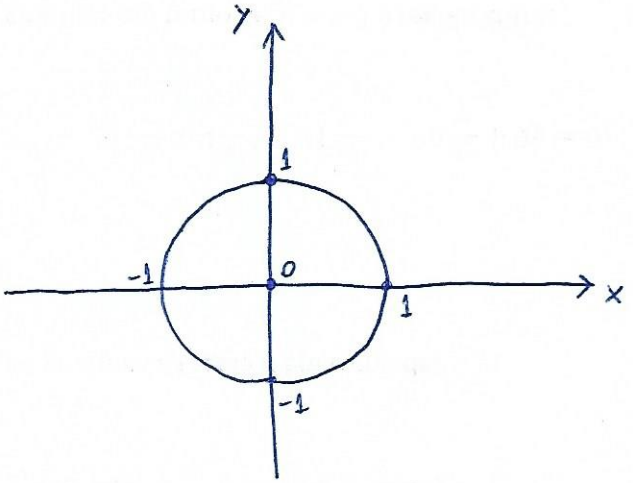
(2)

(a) $\sigma(t) = (\cos(t), \text{sen}(t)), t \in [0, 2\pi)$

CENTRO : (0,0)

RAIO : 1

$x^2 + y^2 = 1$

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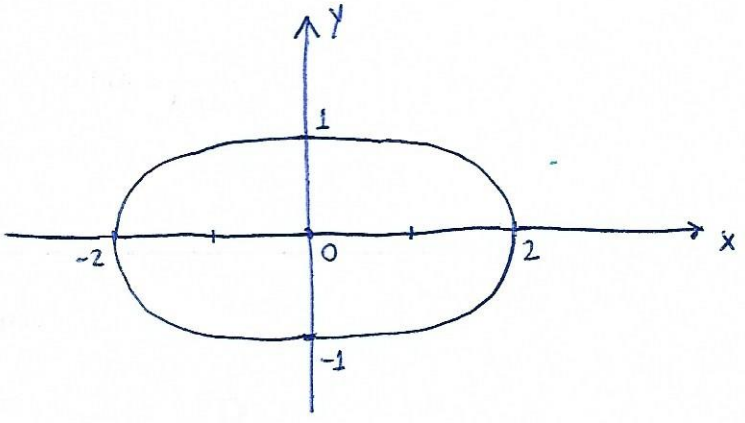
(b) $\sigma(t) = (2\cos(t), \text{sen}(t)), t \in [0, 2\pi)$

CENTRO: (0,0)

S.H. : 2

S.V. : 1

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



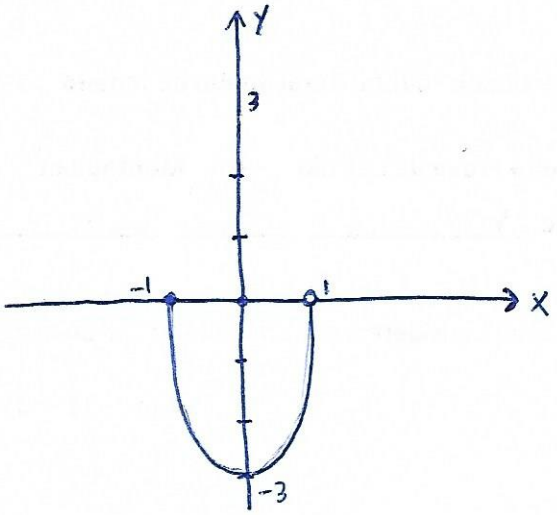
ⓒ $\sigma(t) = (\cos(t), 3\operatorname{sen}(t))$ , $t \in [\pi, 2\pi)$

CENTRO: $(0,0)$

S.M. : 1

S.V. : 3

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



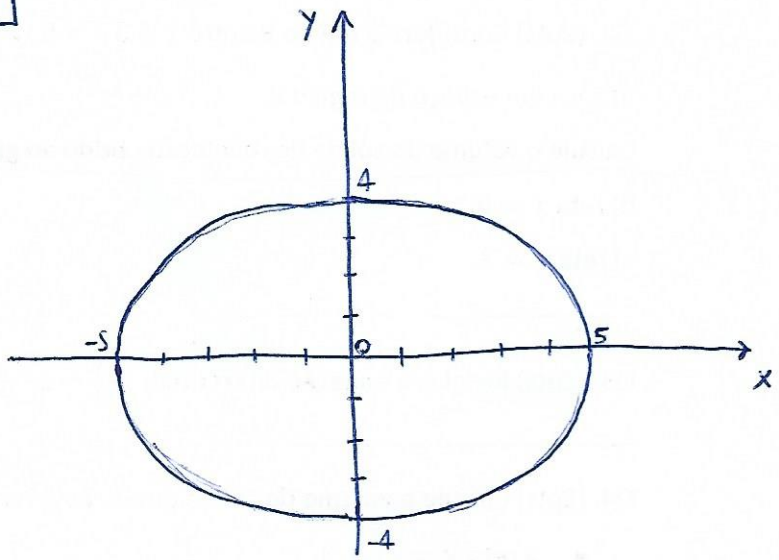

ⓓ $\sigma(t) = (5\cos(t), 4\operatorname{sen}(t))$ , $t \in [0, 2\pi)$

CENTRO : $(0,0)$

S.M. : 5

S.V. : 4

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

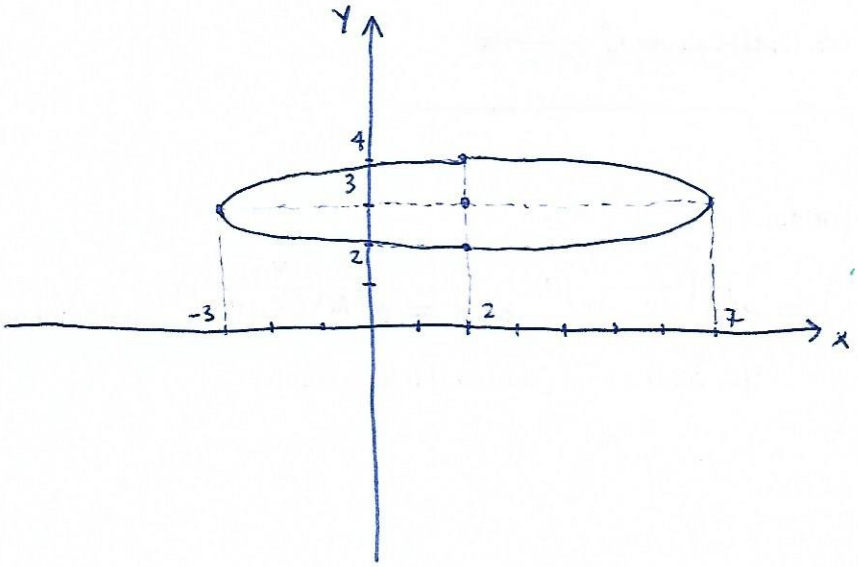



ⓔ $\sigma(t) = (2 + 5\cos(t), 3 + \operatorname{sen}(t))$ , $t \in [0, 2\pi)$

CENTRO : $(2,3)$

S.M. : 5

S.V. : 1



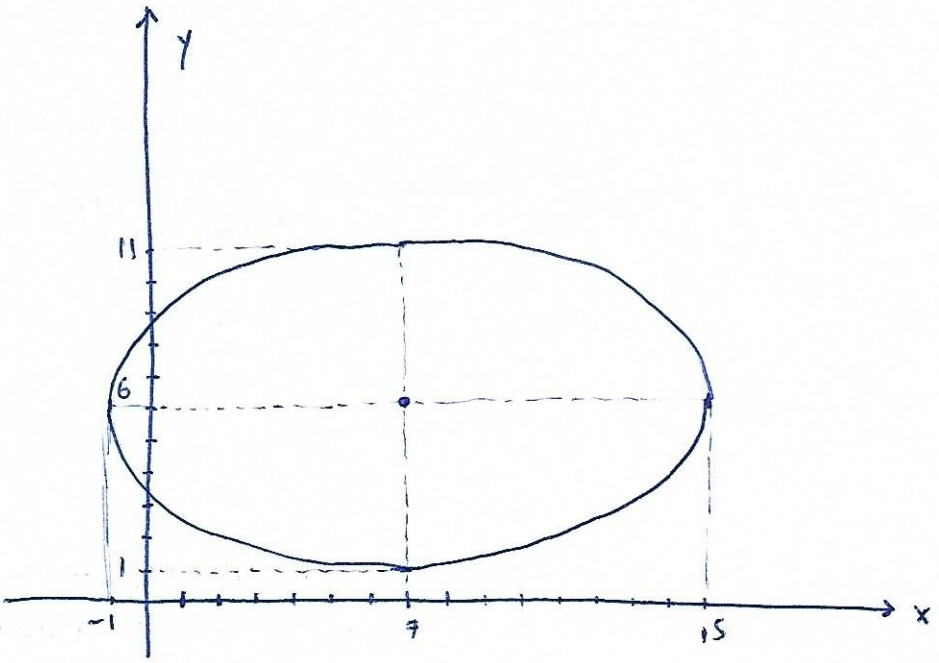
(f) $\sigma(t) = (7 + 8\cos(t), 6 + 5\operatorname{sen}(t))$, $t \in [0, 2\pi)$

CENTRO : $(7, 6)$

S.M. : 8

S.V. : 5

$$\frac{(x-7)^2}{64} + \frac{(y-6)^2}{25} = 1$$

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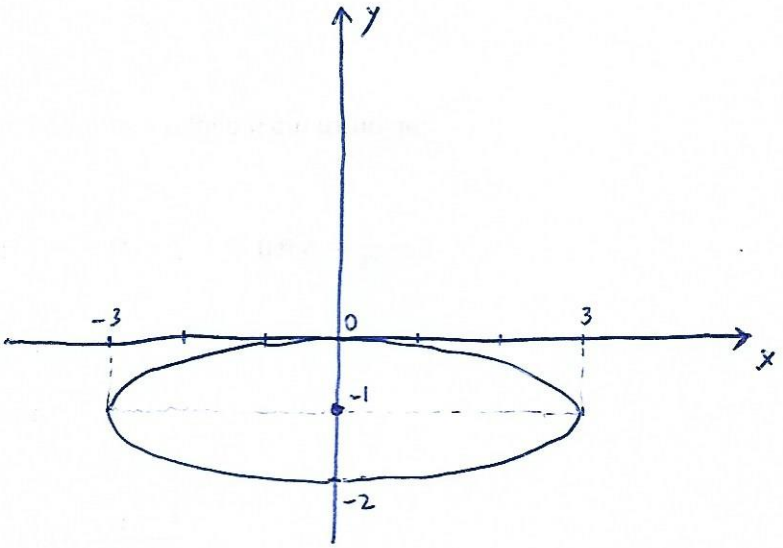
(g) $\sigma(t) = (3\cos(t), -1 + \operatorname{sen}(t))$, $t \in [0, 2\pi)$

CENTRO : $(0, -1)$

S.M. : 3

S.V. : 1

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



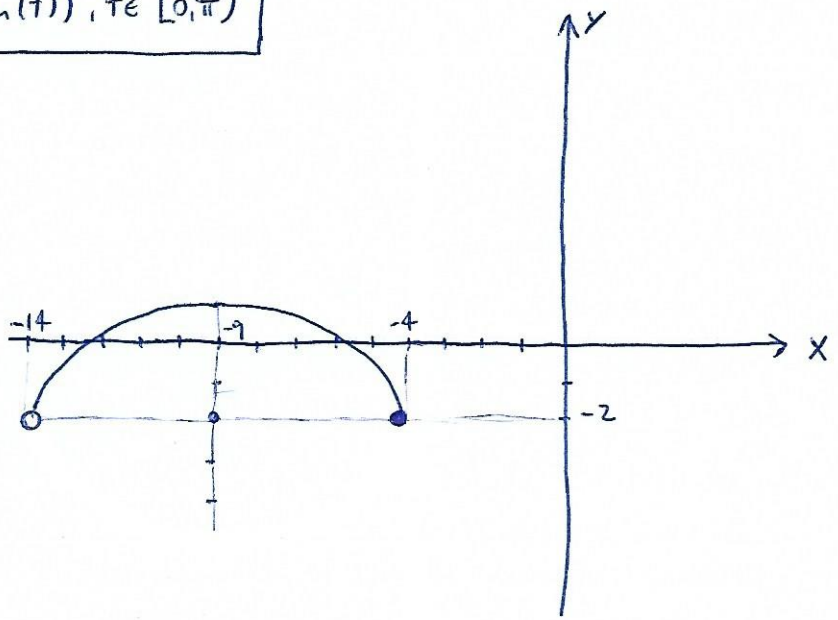
(h) $\sigma(t) = (-9 + 5\cos(t), -2 + 3\operatorname{sen}(t)),\ t \in [0, \pi)$

CENTRO : $(-9, -2)$

S.H. : 5

S.V. : 3

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



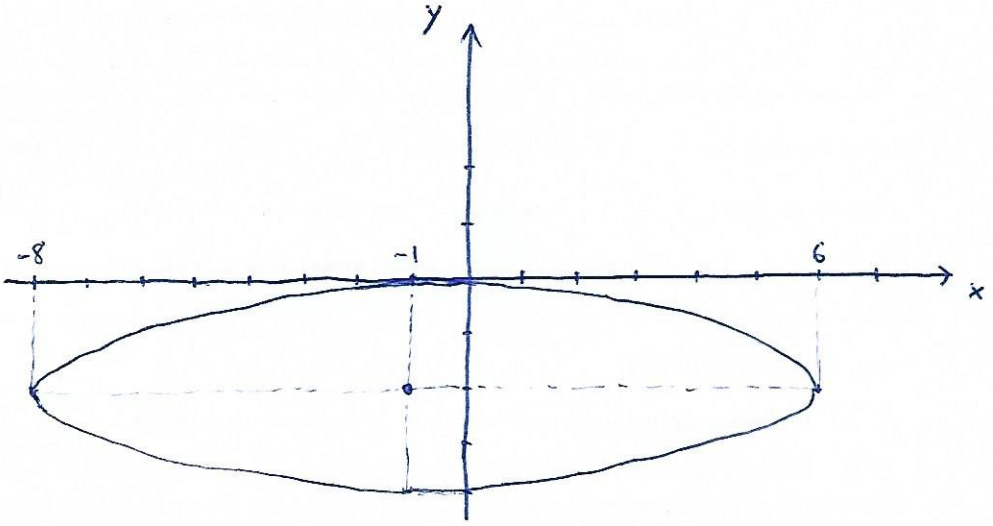

(i) $\sigma(t) = (-1 + 7\cos(t), -2 + 2\operatorname{sen}(t)),\ t \in [0, 2\pi)$

CENTRO : $(-1, -2)$

S.H. : 7

S.V. : 2

$$\frac{(x+1)^2}{49} + \frac{(y+2)^2}{4} = 1$$

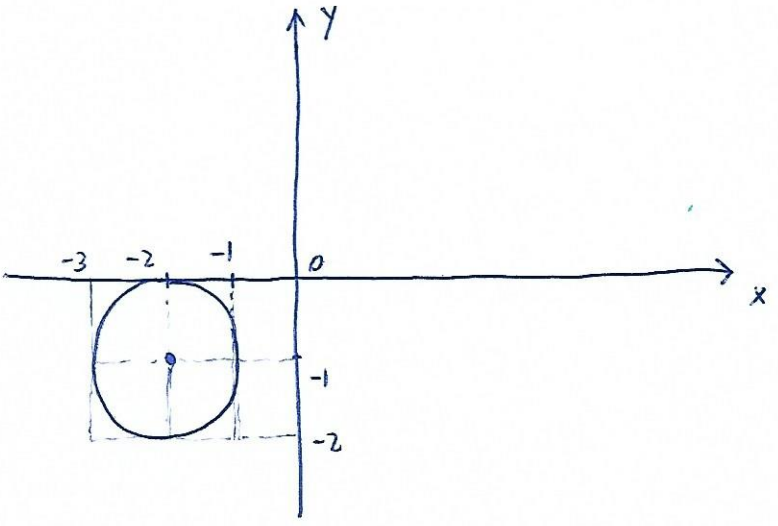



(j) $\sigma(t) = (-2 + \cos(t), -1 + \operatorname{sen}(t)),\ t \in [0, 2\pi)$

CENTRO : $(-2, -1)$

RAIO : 1

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

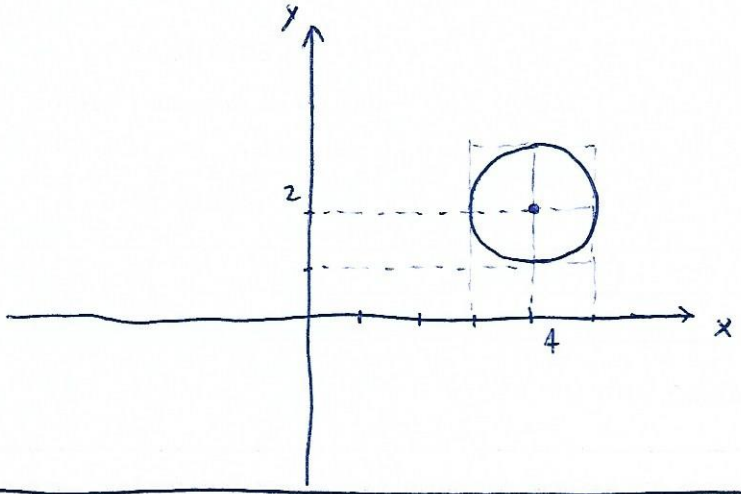


(k) $\sigma(t) = (4 + \cos(t),\ 2 + \operatorname{sen}(t)),\ t \in [0, 2\pi)$

CENTRO: $(4, 2)$

RAIO: $1$

$$(x-4)^2 + (y-2)^2 = 1$$



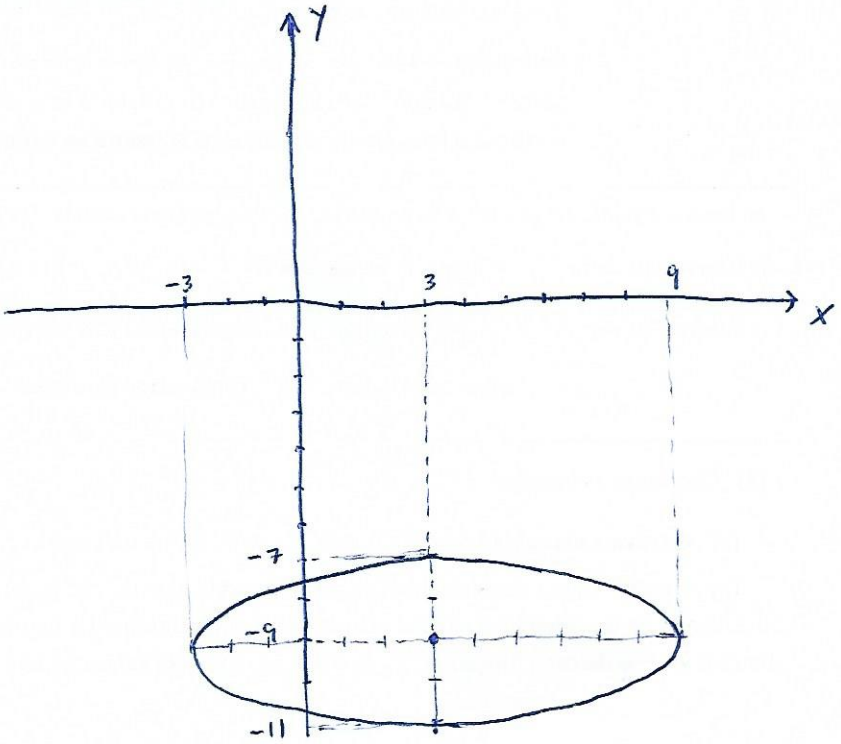

(l) $\sigma(t) = (3 + 6\cos(t),\ -9 + 2\operatorname{sen}(t)),\ t \in [0, 2\pi)$

CENTRO: $(3, -9)$

S.H.: $6$

S.V.: $2$

$$\frac{(x-3)^2}{36} + \frac{(x+9)^2}{4} = 1$$



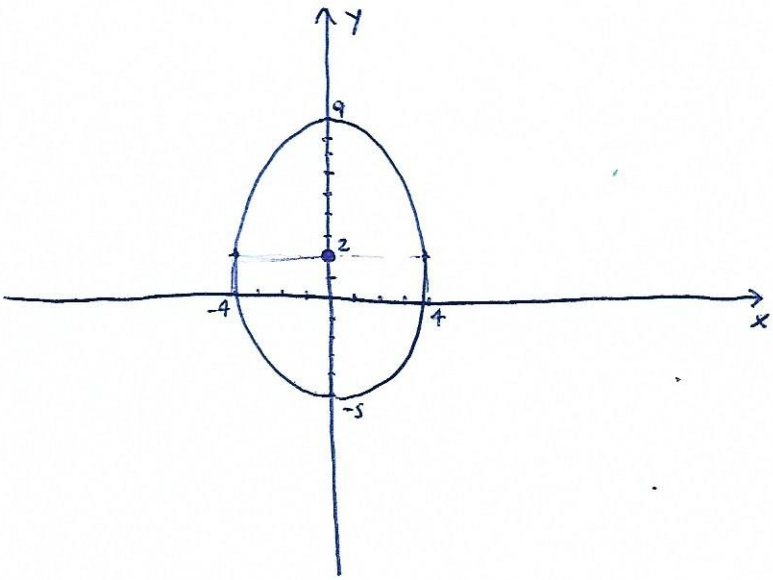

(m) $\sigma(t) = (4\cos(t),\ 2 + 7\operatorname{sen}(t)),\ t \in [0, 2\pi)$

CENTRO: $(0, 2)$

S.H.: $4$

S.V.: $7$

$$\frac{x^2}{16} + \frac{(y-2)^2}{49} = 1$$



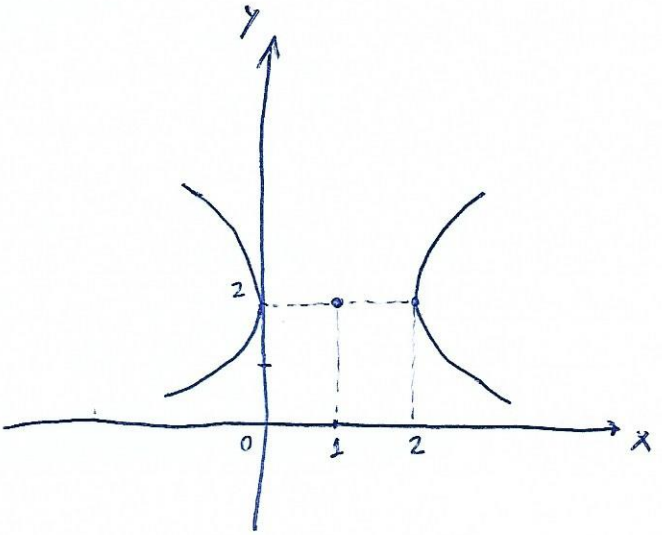
(n) $\sigma(t) = (1 \pm \cosh(t), 2 + 3\sinh(t))$, $t \in \mathbb{R}$

CENTRO: $(1,2)$

S.R.: 1

S.I.: 3

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

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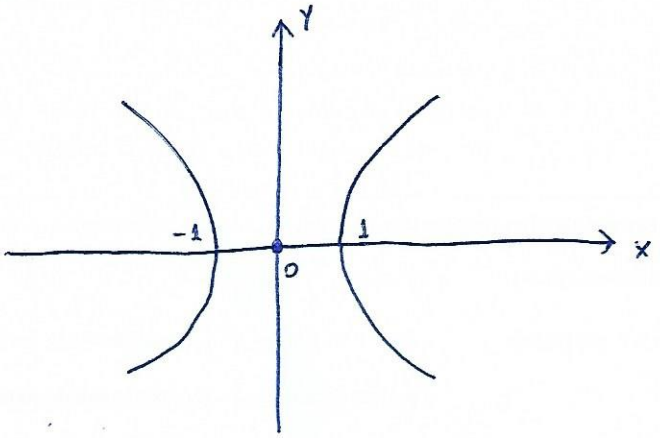
(o) $\sigma(t) = (\pm\cosh(t), \sinh(t))$, $t \in \mathbb{R}$

CENTRO: $(0,0)$

S.R.: 1

S.I.: 1

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

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3

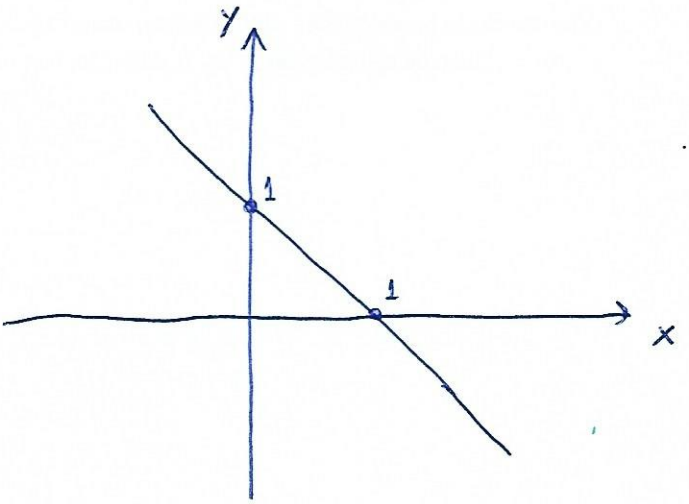
(a) $\sigma(t) = (-1+t, 2-t)$, $t \in \mathbb{R}$

$$\begin{cases} x = -1 + t \rightarrow t = x + 1 \\ y = 2 - t \end{cases}$$

$$y = 2 - (x+1)$$

$$y = 2 - x - 1$$

$$x + y = 1$$



**(b)** $\sigma(t) = (-1+t^2,\ 2-t^2)$ , $t \in \mathbb{R}$

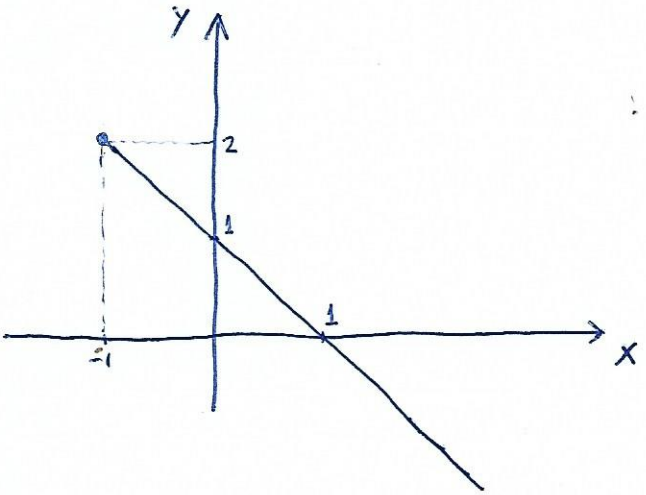
$$\begin{cases} x = -1+t^2 \rightarrow t^2 = x+1 \\ y = 2-t^2 \end{cases}$$

$$\hookrightarrow y = 2-(x+1)$$

$$y = 2-x-1$$

$$\boxed{x+y=1}$$

Mas como $x = -1+t^2$, o domínio é $[-1, \infty)$




É uma semirreta

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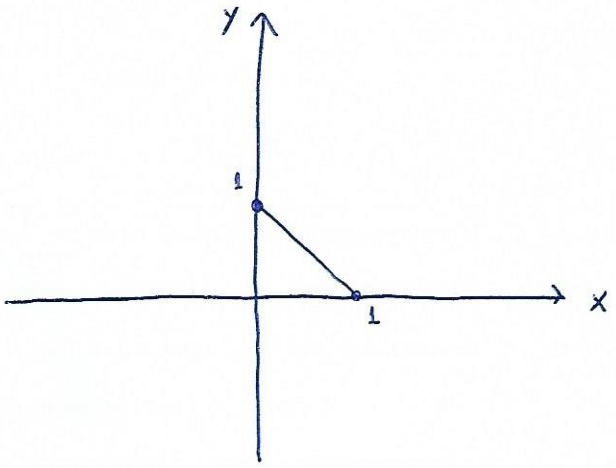
**(c)** $\sigma(t) = (\cos^2(t),\ \text{sen}^2(t))$ , $t \in \mathbb{R}$

$$\begin{cases} x = \cos^2(t) \\ y = \text{sen}^2(t) \end{cases}$$

Como $\cos^2(t) + \text{sen}^2(t) = 1$,

então $\boxed{x+y=1}$

Mas como $x = \cos^2(t)$, então $x \in [0,1]$

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**(d)** $\sigma(t) = (\text{sen}(t),\ \cos(2t))$ , $t \in \mathbb{R}$

$$\begin{cases} x = \text{sen}(t) \\ y = \cos(2t) \end{cases}$$

Como $\cos(2t) = \cos^2(t) - \text{sen}^2(t)$

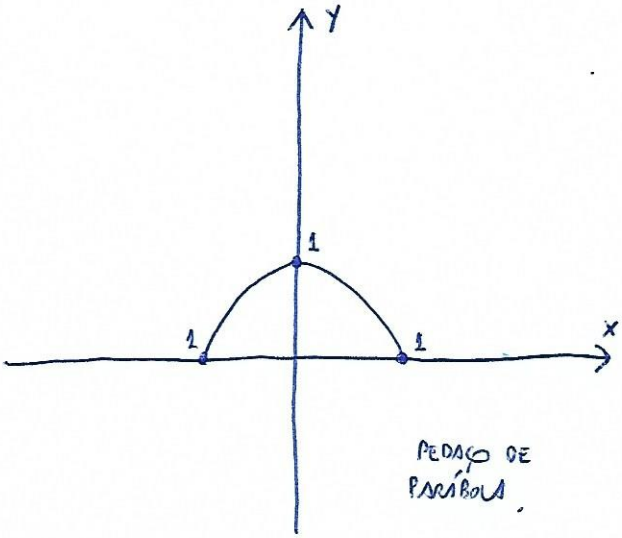
E $\cos^2(t) = 1 - \text{sen}^2(t)$, então:

$$y = \cos(2t) = 1 - 2\,\text{sen}^2(t) = 1-x^2$$

$$\boxed{y = 1-x^2}$$

E como $x = \text{sen}(t)$,

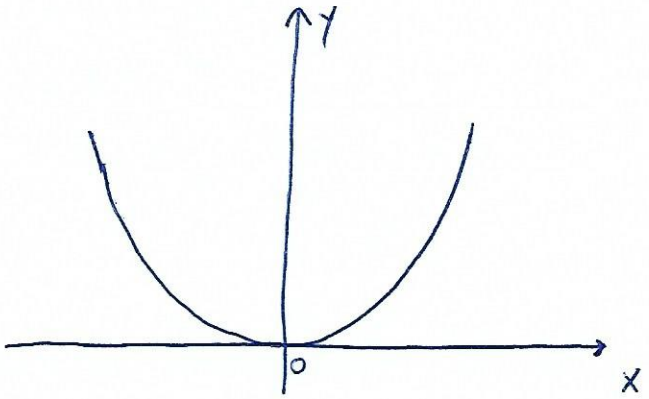
$$\boxed{x \in [-1,1]}.$$




Pedaço de parábola.

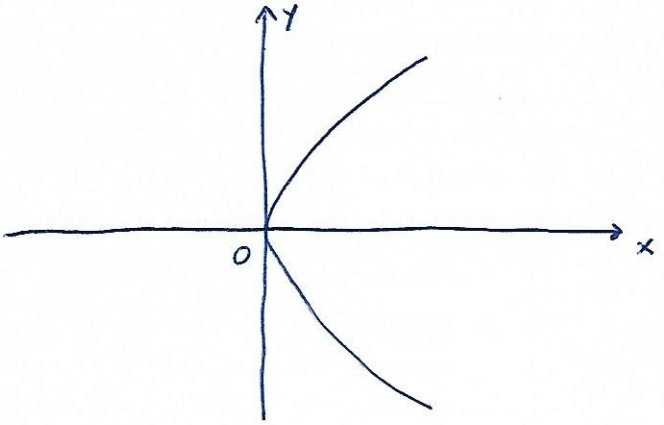
(e) $\sigma(t) = (t, t^2)$, $t \in \mathbb{R}$

$$\begin{cases} x = t \\ y = t^2 \end{cases} \rightarrow \boxed{y = x^2}$$




(f) $\sigma(t) = (t^2, t)$, $t \in \mathbb{R}$

$$\begin{cases} x = t^2 \\ y = t \end{cases} \rightarrow x = y^2$$

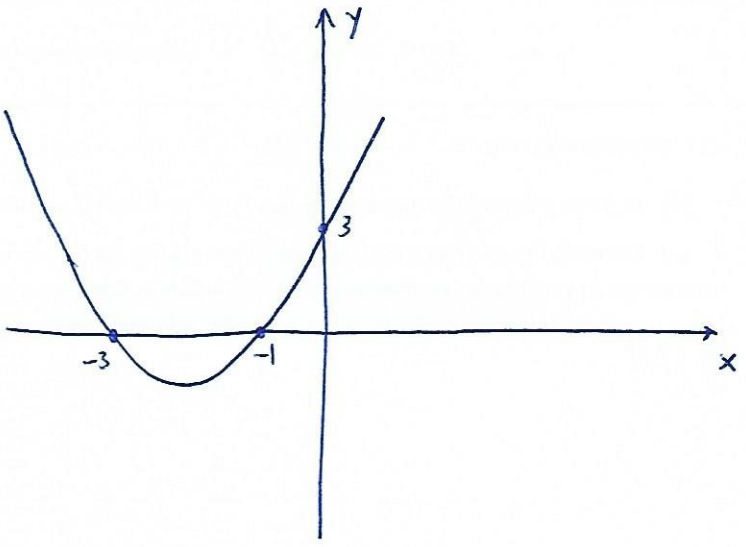



(g) $\sigma(t) = (t, t^2 + 4t + 3)$, $t \in \mathbb{R}$

$$\begin{cases} x = t \\ y = t^2 + 4t + 3 \end{cases}$$

$$\downarrow$$

$$\boxed{y = x^2 + 4x + 3}$$




(h) $\sigma(t) = (t, f(t))$, $t \in \mathbb{R}$

$$\begin{cases} x = t \\ y = f(t) \end{cases} \rightarrow \boxed{y = f(x)}$$

④

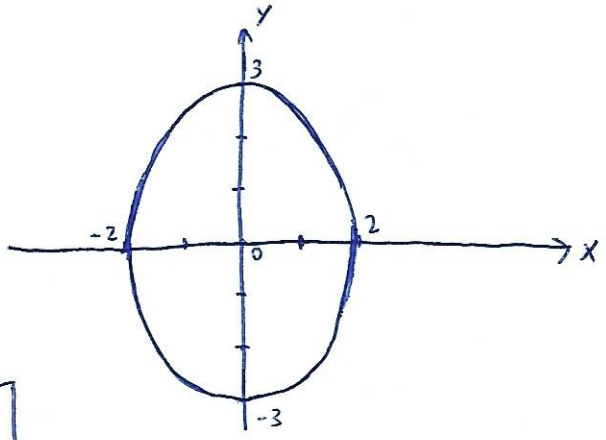
ⓐ $\frac{x^2}{4} + \frac{y^2}{9} = 1$

CENTRO : (0,0)

S.H. : 2

S.V. : 3

$\sigma(t) = (2\cos(t), 3\operatorname{sen}(t)),\ t \in [0, 2\pi)$

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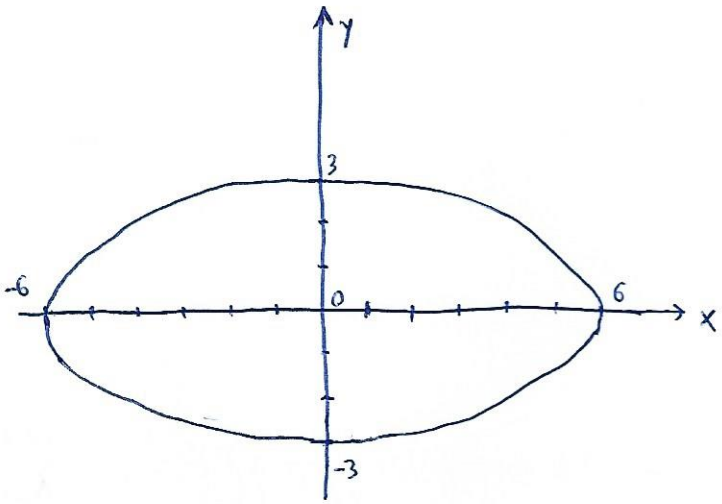
ⓑ $\frac{x^2}{36} + \frac{y^2}{9} = 1$

CENTRO: (0,0)

SH.: 6

S.V. : 3

$\sigma(t) = (6\cos(t), 3\operatorname{sen}(t)),\ t \in [0, 2\pi)$




---

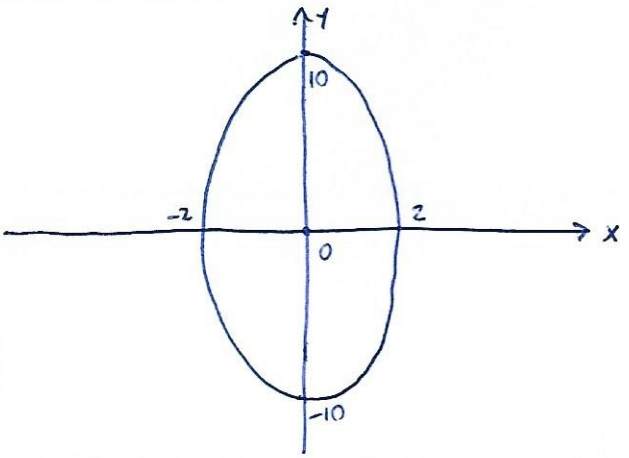
ⓒ $\frac{x^2}{4} + \frac{y^2}{100} = 1$

CENTRO : (0,0)

S.M. : 2

S.V. : 10

$\sigma(t) = (2\cos(t), 10\operatorname{sen}(t)),\ t \in [0, 2\pi)$

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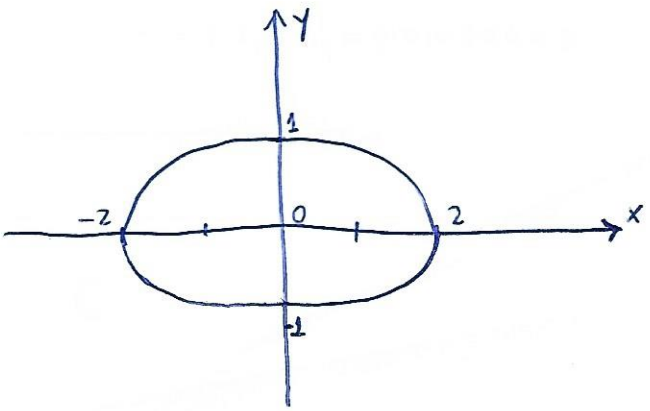
ⓓ $\frac{x^2}{4} + y^2 = 1$

CENTRO : (0,0)

S.M. : 2

S.V. : 1

$\sigma(t) = (2\cos(t), \operatorname{sen}(t)),\ t \in [0, 2\pi)$



(e) $2x^2+3y^2=5$

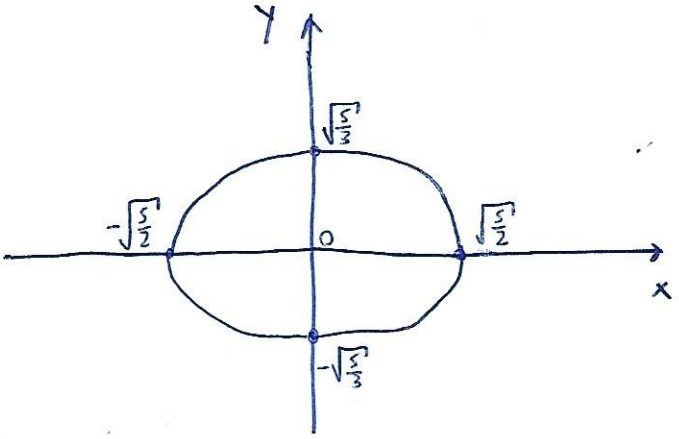
$$\frac{x^2}{\frac{5}{2}}+\frac{y^2}{\frac{5}{3}}=1$$

CENTRO : $(0,0)$

S.H. : $\sqrt{\frac{5}{2}}$

S.V. : $\sqrt{\frac{5}{3}}$

$$\sigma(t)=\left(\sqrt{\frac{5}{2}}\cos(t),\sqrt{\frac{5}{3}}\operatorname{sen}(t)\right),\ t\in[0,2\pi)$$

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(f) $x^2+9y^2=3$

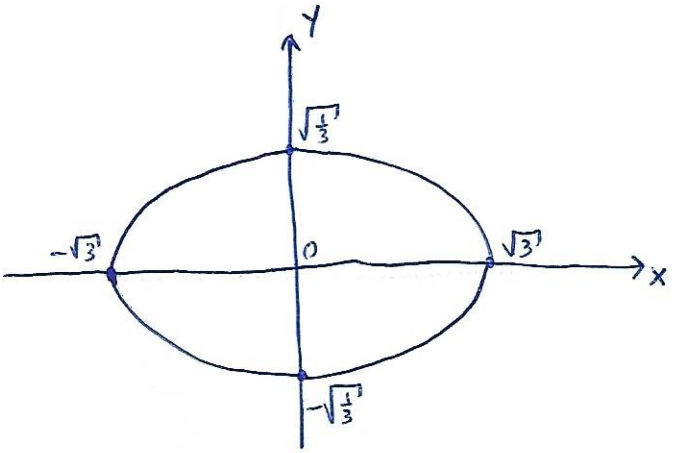
$$\frac{x^2}{3}+\frac{y^2}{\frac{1}{3}}=1$$

CENTRO : $(0,0)$

S.H. : $\sqrt{3}$

S.V. : $\sqrt{\frac{1}{3}}$

$$\sigma(t)=\left(\sqrt{3}\cos(t),\sqrt{\frac{1}{3}}\operatorname{sen}(t)\right),\ t\in[0,2\pi)$$

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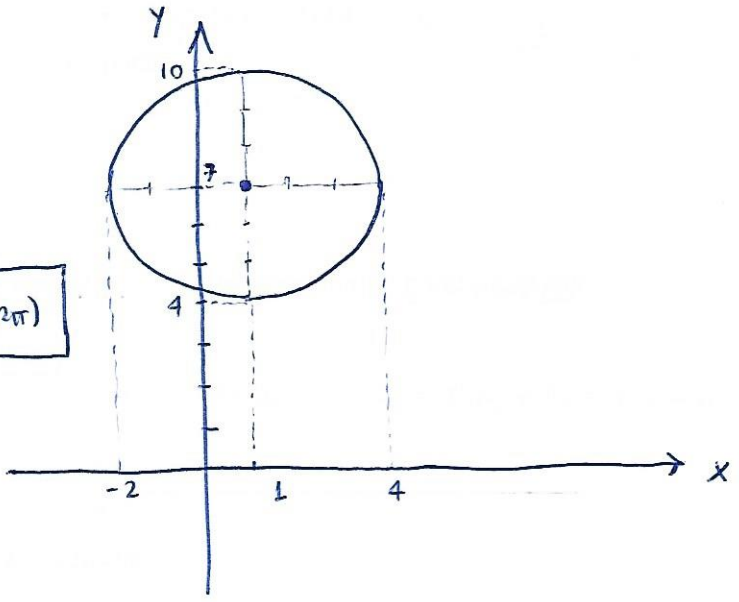
(g) $(x-1)^2+(y-7)^2=9$

CENTRO : $(1,7)$

RAIO : 3

$$\sigma(t)=(1+3\cos(t),7+3\operatorname{sen}(t)),\ t\in[0,2\pi)$$

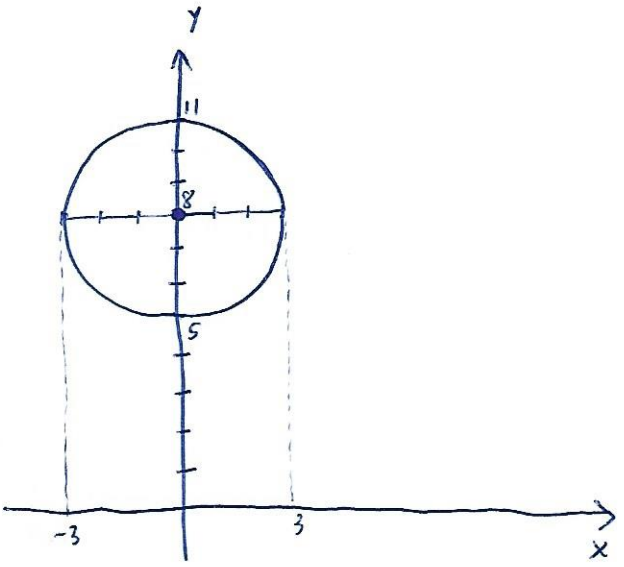


(h) $x^2 + (y-8)^2 = 9$

CENTRO: $(0,8)$

RAIO: $3$

$\sigma(t) = (3\cos(t), 8 + 3\sen(t)),\ t \in [0, 2\pi)$

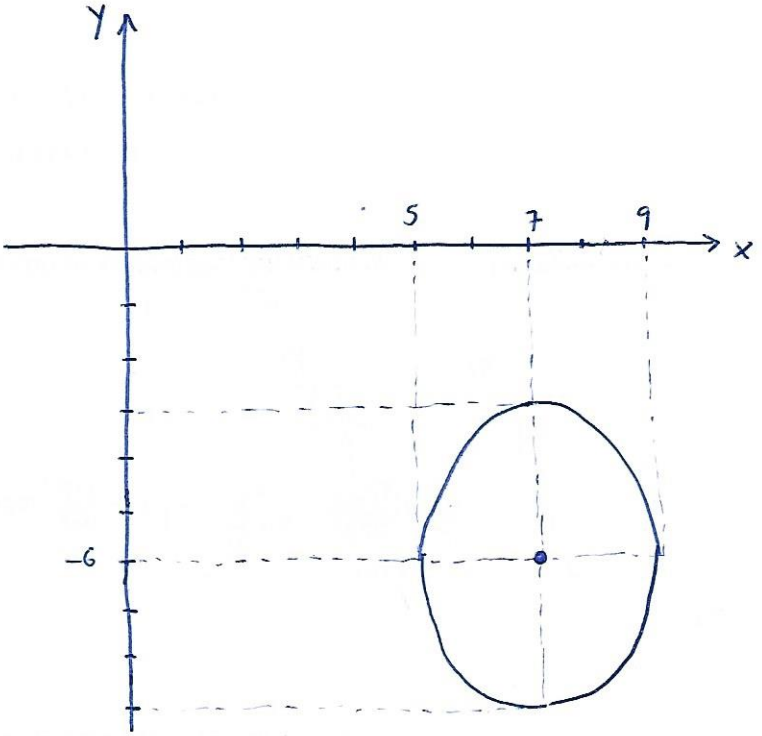



(i) $\frac{(x-7)^2}{4} + \frac{(y+6)^2}{9} = 1$

CENTRO: $(7,-6)$

S.H.: 2

S.V.: 3

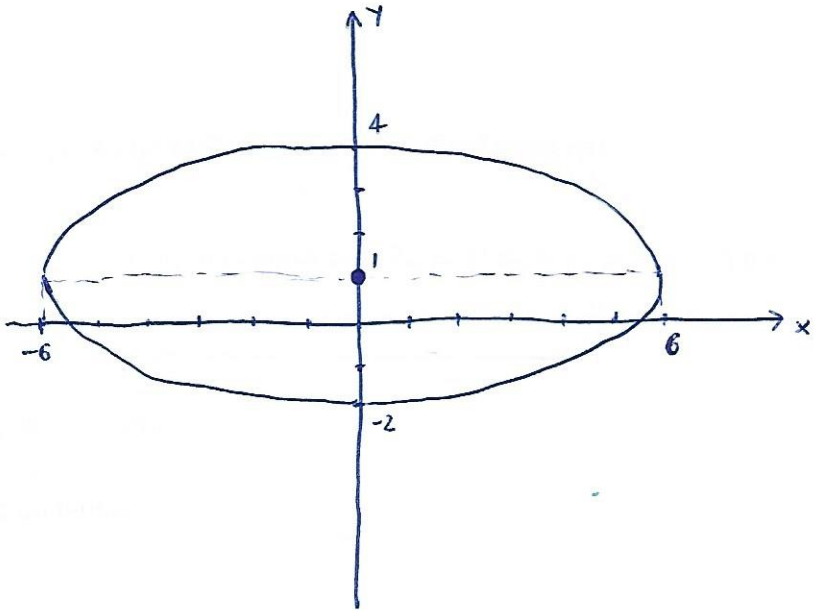



(j) $\frac{x^2}{36} + \frac{(y-1)^2}{9} = 1$

CENTRO: $(0,1)$

S.H.:

S.V.:



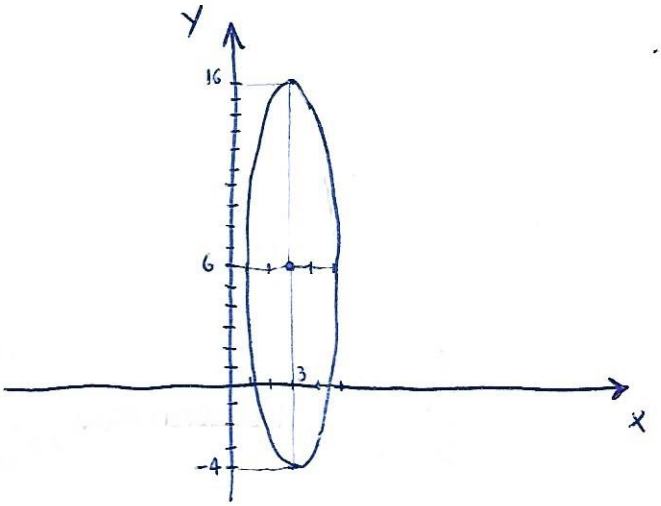
(k) $\frac{(x-3)^2}{4} + \frac{(y-6)^2}{100} = 1$

CENTRO: $(3,6)$

S.H.: 2

S.V.: 10

$\sigma(t) = (3 + 2\cos(t), 6 + 10\,\text{sen}(t)),\ t \in [0, 2\pi)$

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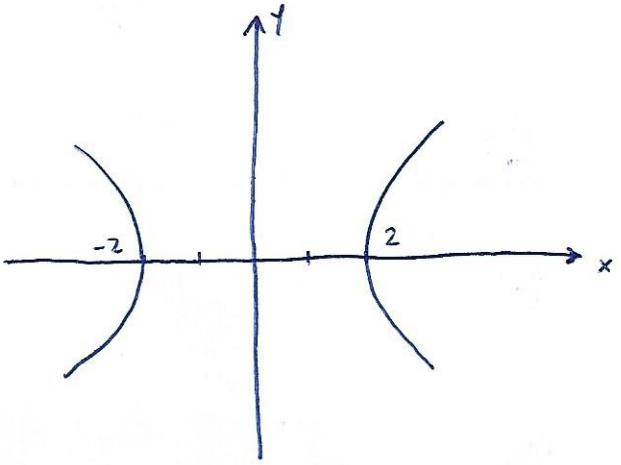
(l) $\frac{x^2}{4} - \frac{y^2}{9} = 1$

CENTRO: $(0,0)$

S.R.: 2

S.I.: 3

$\sigma(t) = (\pm 2\cosh(t), 3\,\text{senh}(t)),\ t \in \mathbb{R}$

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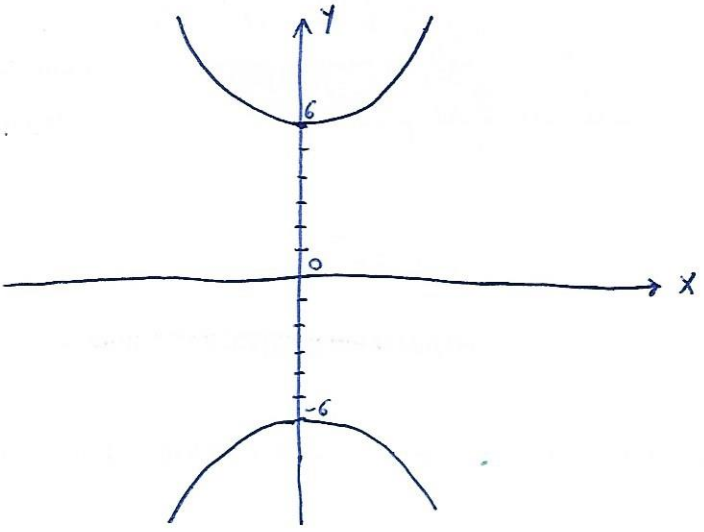
(m) $\frac{y^2}{36} - \frac{x^2}{9} = 1$

CENTRO: $(0,0)$

S.R.: 6

S.I.: 3

$\sigma(t) = (3\,\text{senh}(t), \pm 6\cosh(t)),\ t \in \mathbb{R}$



(n) $5x^2 - 3y^2 = 5$

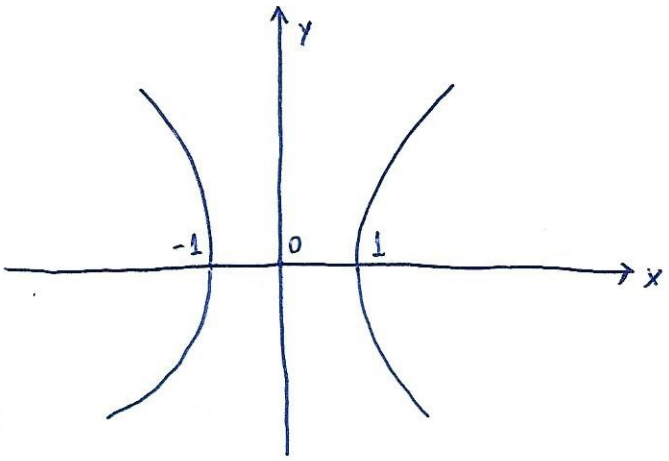
$$x^2 - \frac{y^2}{\frac{5}{3}} = 1$$

CENTRO: $(0,0)$

S.R.: $1$

S.I.: $\sqrt{\frac{5}{3}}$

$$\sigma(t) = \left(\pm\cosh(t), \sqrt{\tfrac{5}{3}}\sinh(t)\right),\ t \in \mathbb{R}$$

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(o) $y^2 - 4x^2 = 3$

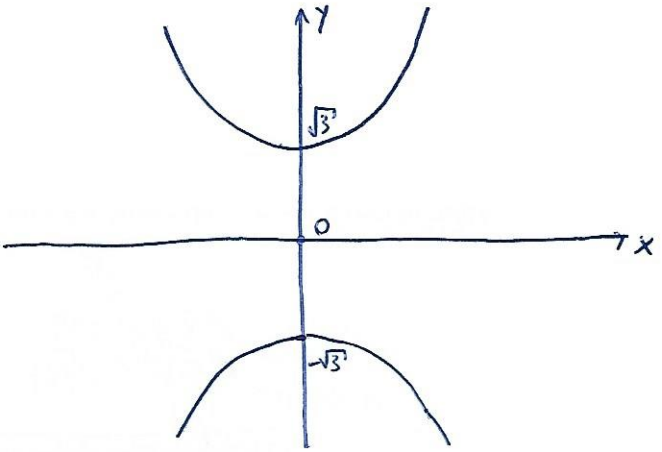
$$\frac{y^2}{3} - \frac{x^2}{\frac{3}{4}} = 1$$

CENTRO: $(0,0)$

S.R.: $\sqrt{3}$

S.I.: $\sqrt{\frac{3}{4}}$

$$\sigma(t) = \left(\sqrt{\tfrac{3}{4}}\sinh(t), \pm\sqrt{3}\cosh(t)\right),\ t \in \mathbb{R}$$

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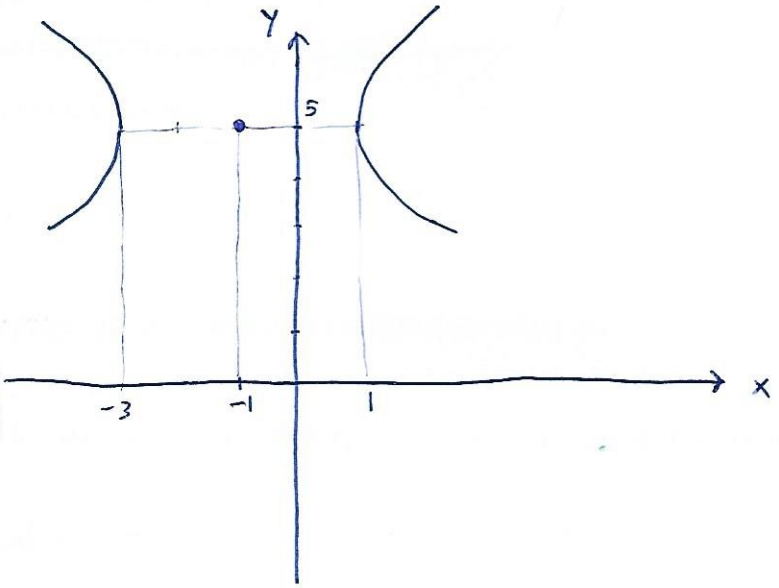
(p) $\frac{(x+1)^2}{4} - \frac{(y-5)^2}{9} = 1$

CENTRO: $(-1,5)$

S.R.: $2$

S.I.: $3$

$$\sigma(t) = (-1 \pm 2\cosh(t), 5 + 3\sinh(t)),\ t \in \mathbb{R}$$

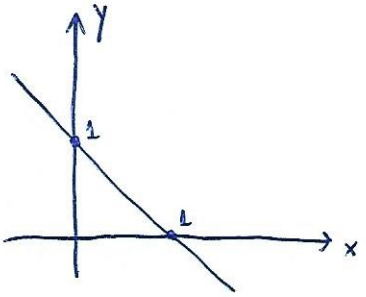


(7) $x+y=1$

$x=t$

$y=1-x=1-t$

$\sigma(t)=(t,1-t)\ ,\ t\in\mathbb{R}$

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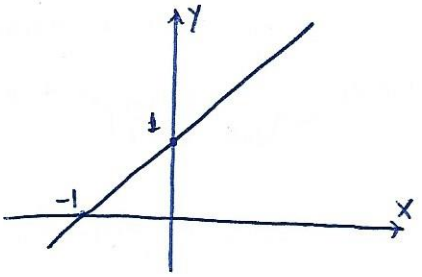
(8) $y-1=x$

$y=t$

$x=t-1$

$\sigma(t)=(t-1,t)\ ,\ t\in\mathbb{R}$

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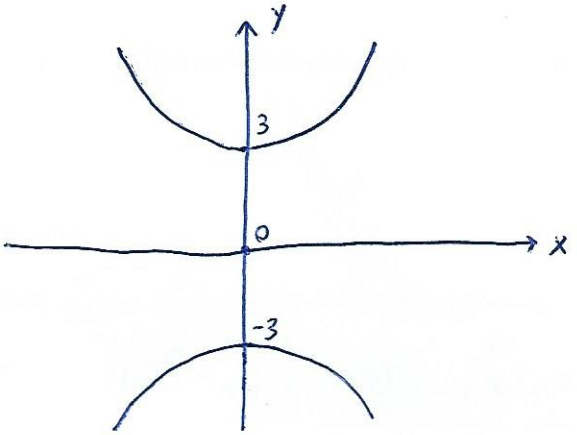
(9) $\frac{-x^2}{4}+\frac{y^2}{9}=1$

CENTRO: (0,0)

S.R.: 3

S.I.: 2

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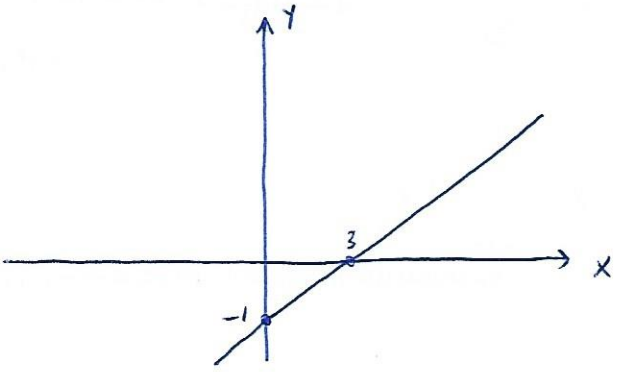
(10) $3y=x-3$

$x=3+3y$

$y=t$

$x=3+3t$

$\sigma(t)=(3+3t,t)\ ,\ t\in\mathbb{R}$

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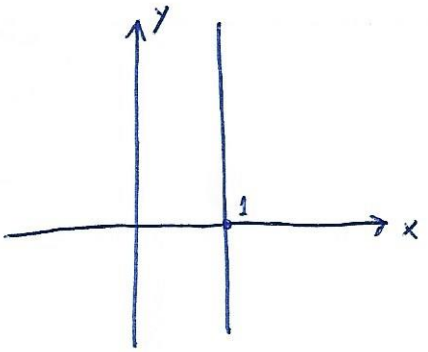
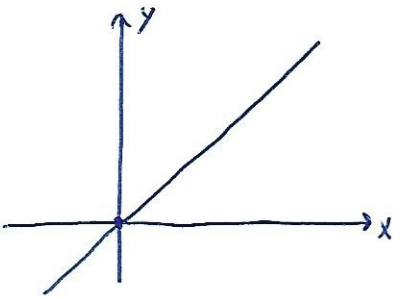
(11) $x=1$

$\sigma(t)=(1,t)\ ,\ t\in\mathbb{R}$



(v) $y = x$

$\sigma(t) = (t,t), t \in \mathbb{R}$

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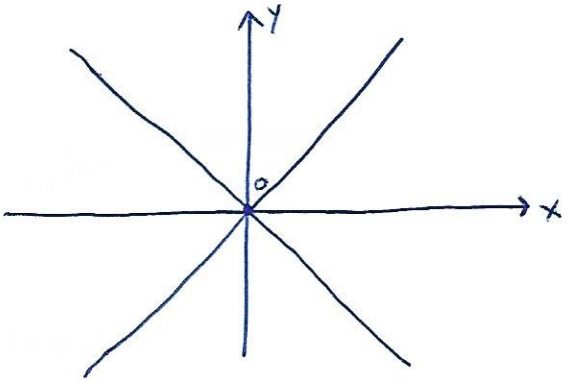
(w) $x^2 = y^2$

$y = x \rightarrow \sigma_1(t) = (t,t), t \in \mathbb{R}$

$y = -x \rightarrow \sigma_2(t) = (t,-t), t \in \mathbb{R}$

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(x) $\frac{(x-3)^2}{4} + \frac{(y-6)^2}{9} = -1$

SOMA DE POSITIVOS RESULTANDO NUM NEGATIVO. VAZIO.

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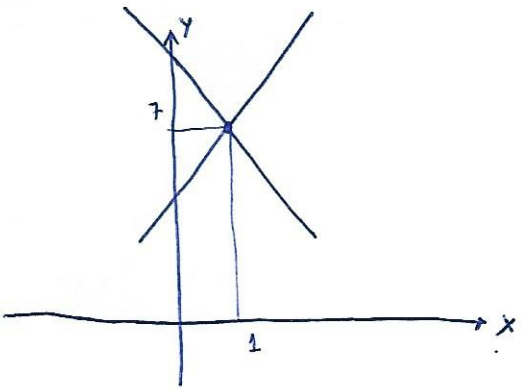
(y) $(x-1)^2 = (y-7)^2$

$x-1 = y-7 \rightarrow x = y-6 \rightarrow \sigma_1(t) = (t-6,t), t \in \mathbb{R}$

$x-1 = -y+7 \rightarrow x = -y+8 \rightarrow \sigma_2(t) = (-t+8,t), t \in \mathbb{R}$

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(z) $x + 2y - 9 = 0$

$x = 9 - 2y$

$\sigma(t) = (9-2t,t), t \in \mathbb{R}$