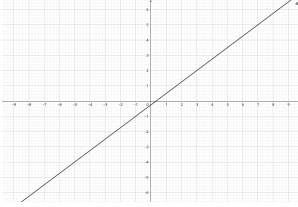
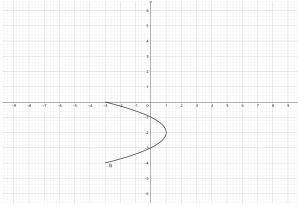


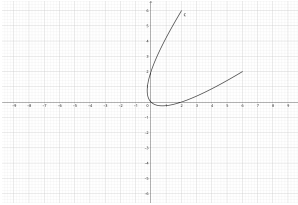
1. a) ■ $x = 3 - 4t \Rightarrow \star : \frac{-x+3}{4} = t$
 ■ $y = 2 - 3t \xRightarrow{\star} y = 2 - 3\left(\frac{-x+3}{4}\right) \equiv y = \frac{3x}{4} - \frac{1}{4}$



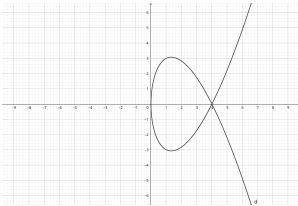
- b) ■ $x = 1 - t^2$
 ■ $y = t - 2$
 ■ $-2 \leq t \leq 2$
 ■ No es función



- c) ■ $x = t^2 + t$
 ■ $y = t^2 - t$
 ■ $-2 \leq t \leq 2$
 ■ No es función

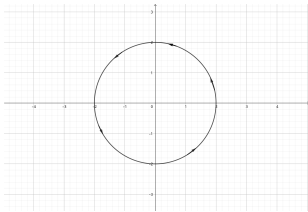


- d) ■ $x = t^2$
 ■ $y = t^3 - 4t$
 ■ $-3 \leq t \leq 3$
 ■ No es función



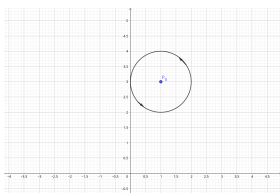
2. a) ■ $r = 2$
 ■ $p = (0, 0)$
 ■ $x^2 + y^2 = 4$
 ■ $\begin{cases} x(t) = 2 \cdot \cos(t) \\ y(t) = 2 \cdot \sin(t) \\ 0 \leq t < 2\pi \end{cases}$

t	x	y
$\frac{\pi}{2}$	0	2
π	-2	0
$\frac{3\pi}{2}$	0	-2



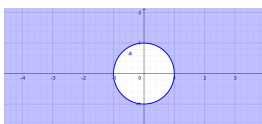
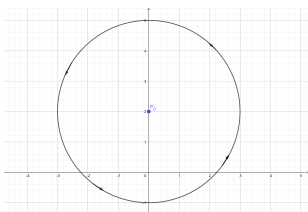
- b) ■ $r = 1$
 ■ $p = (1, 3)$
 ■ $(x - 1)^2 + (y - 3)^2 = 1$
 ■ $\begin{cases} x(t) = 1 + \cos(t) \\ y(t) = 3 + \sin(t) \\ 0 \leq t < 2\pi \end{cases}$

t	x	y
$\frac{\pi}{2}$	1	4
π	0	3
$\frac{3\pi}{2}$	1	2

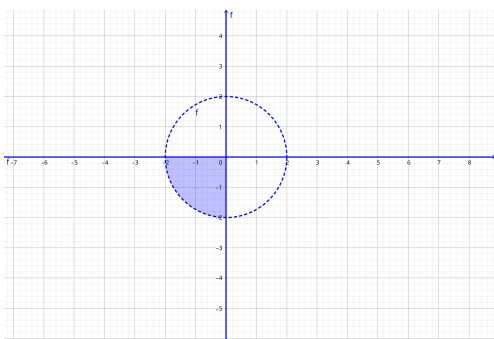


- c) ■ $r = 3$
 ■ $p = (0, 2)$
 ■ $(x)^2 + (y - 2)^2 = 9$
 ■ $\begin{cases} x(t) = 3 \cdot \cos(t) \\ y(t) = 2 + 3 \sin(t) \\ 0 \leq t < 2\pi \end{cases}$

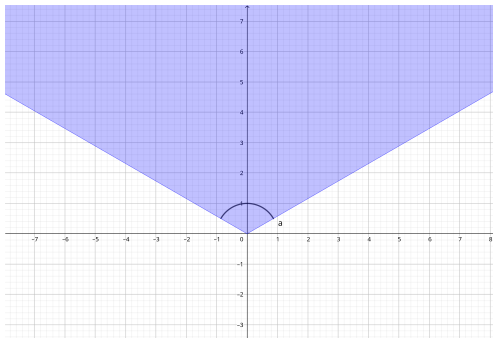
t	x	y
$\frac{\pi}{2}$	0	5
π	-3	2
$\frac{3\pi}{2}$	0	-1



3. a)



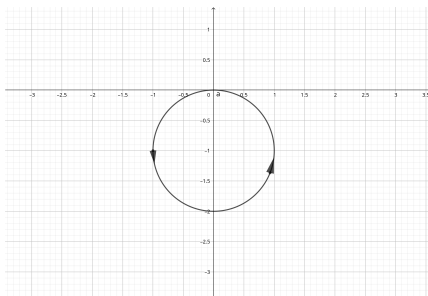
b)



c)

4. a) $\star : r = -2 \sin(\theta)$
- $x = \cos(\theta) \star r \xrightarrow{\star} x = \cos(\theta) \cdot (-2 \sin(\theta))$
 - $x = \sin(\theta) \star r \xrightarrow{\star} y = -2 \sin^2(\theta)$
 - $$\begin{cases} x(t) = -2 \cdot \cos(t) \sin(t) \\ y(t) = -2 \sin^2(\theta) \\ 0 \leq t < \pi \end{cases}$$

t	x	y
$\frac{\pi}{4}$	-1	-1
$\frac{\pi}{2}$	0	-2
π	0	0
$\frac{3\pi}{4}$	1	-1



- b) $\star : r = 1 - \cos(\theta)$
- $x = r \cdot \cos(\theta) \xrightarrow{\star} x = \cos(\theta) - \cos^2(\theta)$
 - $y = r \cdot \sin(\theta) \xrightarrow{\star} y = \sin(\theta) - \sin(\theta) \cdot \cos(\theta)$
 - $r = \sqrt{x^2 + t^2} \xrightarrow{\star}$

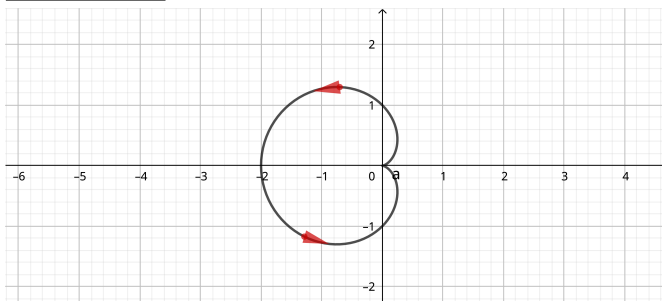
$$\sqrt{x^2 + t^2} = 1 - \cos(\theta) \quad \cos(\theta) = \frac{x}{\sqrt{x^2 + y^2}} \equiv$$

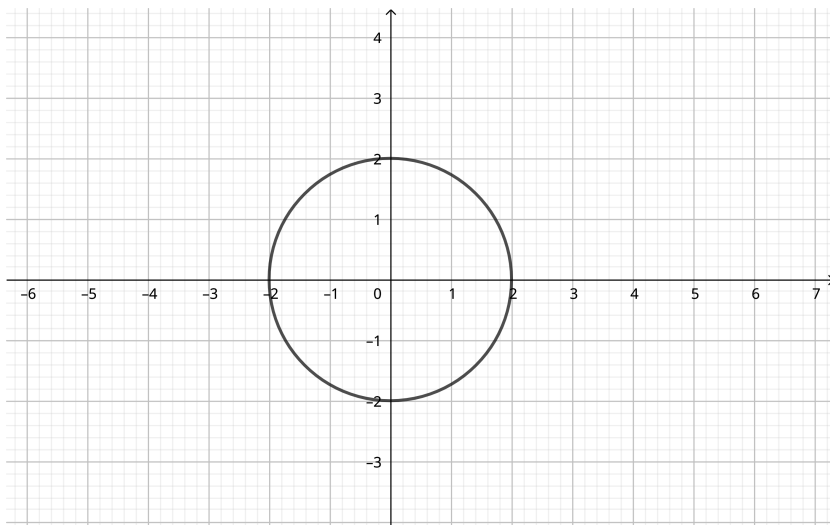
$$\sqrt{x^2 + t^2} = 1 - \frac{x}{\sqrt{x^2 + y^2}} \equiv$$

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

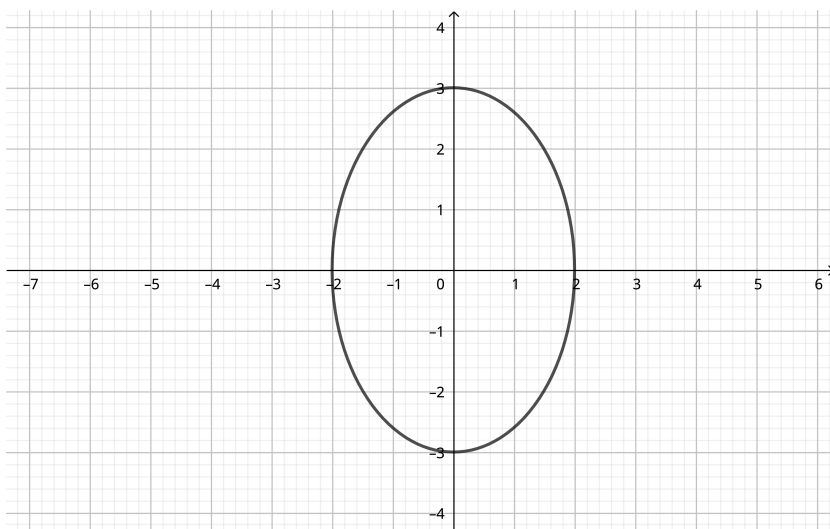
$$\begin{cases} x(\theta) = \cos(\theta) - \cos^2(\theta) \\ y(\theta) = \sin(\theta) - \sin(\theta) \cdot \cos(\theta) \\ 0 \leq \theta < 2\pi \end{cases}$$

t	x	y
0	0	0
π	-2	0

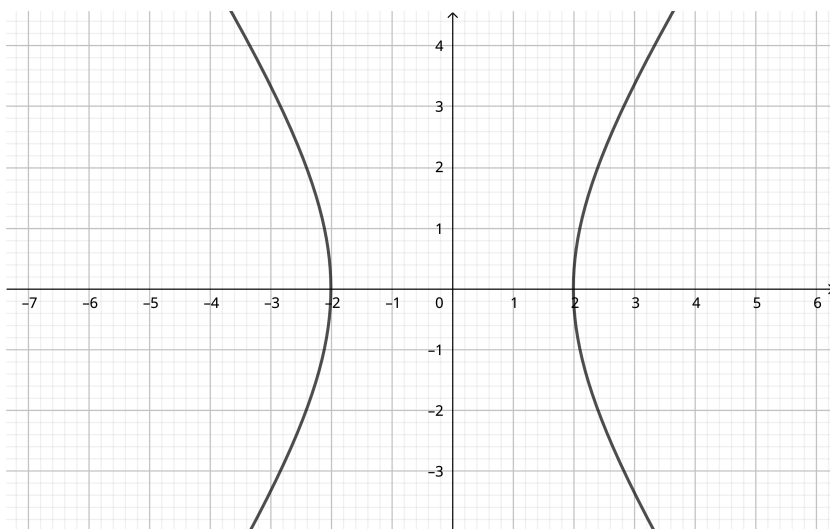




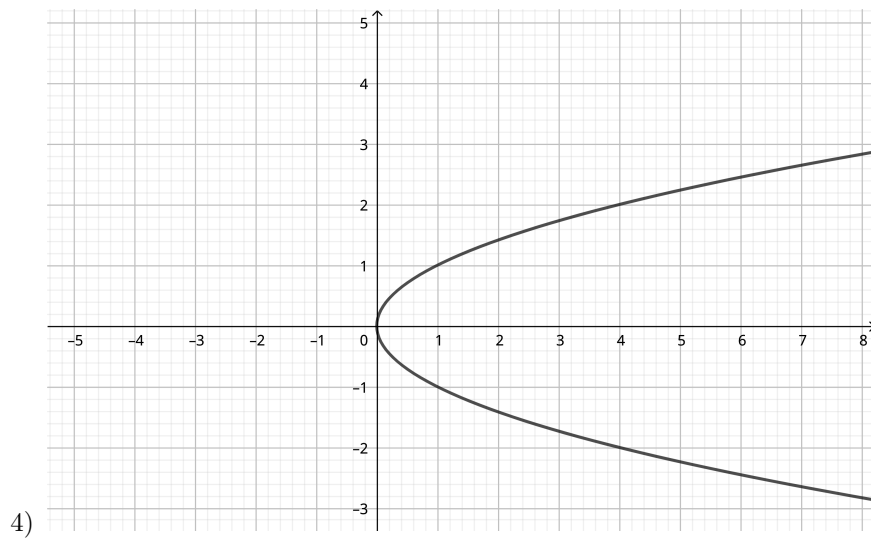
5. a) 1)



2)

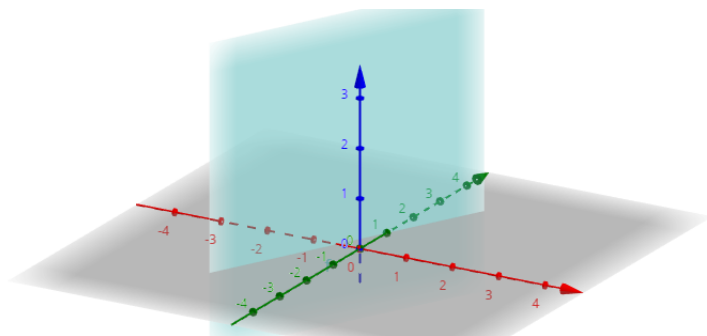


3)

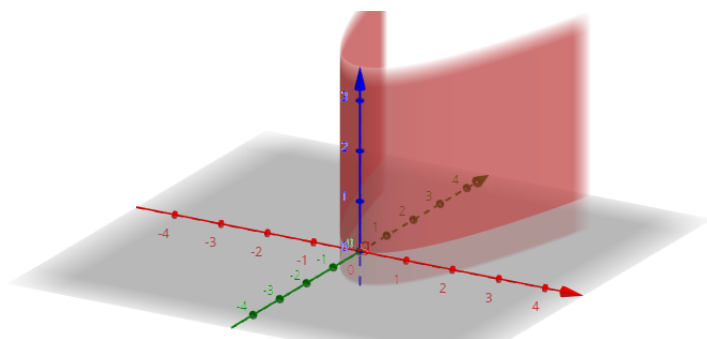


b) Son curvas de nivel, a mayor a mayor ancho, a mayor b mayor altura

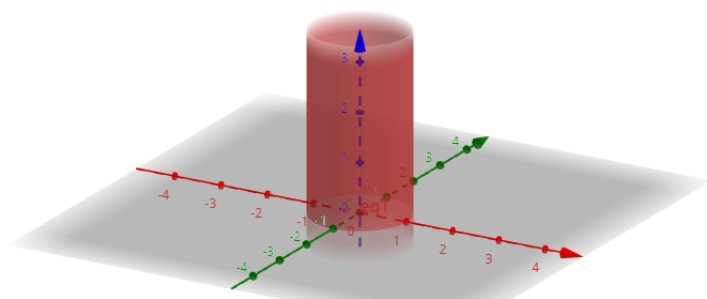
6. a)

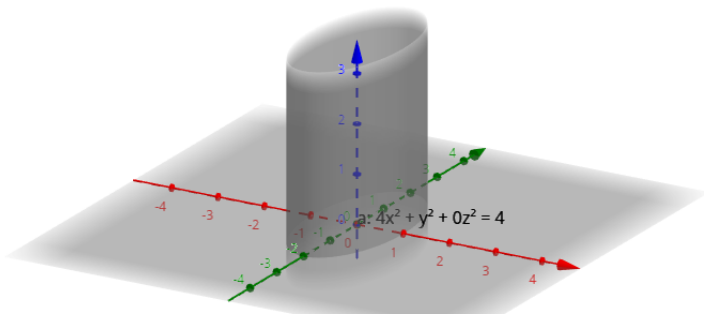


b)



c)





d)

7. a) 1) $x^2 + \frac{y^2}{4} + \frac{z^2}{9} = 1$

- • $\begin{matrix} z=-2 \\ \Rightarrow \end{matrix} x^2 + \frac{y^2}{9} + \frac{4}{9} = 1$ Una elipse
- $\begin{matrix} z=-1 \\ \Rightarrow \end{matrix} x^2 + \frac{y^2}{9} + \frac{1}{9} = 1$ Una elipse
- $\begin{matrix} z=0 \\ \Rightarrow \end{matrix} x^2 + \frac{y^2}{9} = 1$ Circulo
- $\begin{matrix} z=1 \\ \Rightarrow \end{matrix} x^2 + \frac{y^2}{9} + \frac{1}{9} = 1$ Una elipse
- $\begin{matrix} z=2 \\ \Rightarrow \end{matrix} x^2 + \frac{y^2}{9} + \frac{4}{9} = 1$ Una elipse
- • $\begin{matrix} y=-2 \\ \Rightarrow \end{matrix} x^2 + \frac{4}{9} + \frac{z^2}{9} = 1$ Una elipse
- $\begin{matrix} y=-1 \\ \Rightarrow \end{matrix} x^2 + \frac{1}{9} + \frac{z^2}{9} = 1$ Una elipse
- $\begin{matrix} y=0 \\ \Rightarrow \end{matrix} x^2 + \frac{z^2}{9} = 1$ Circulo
- $\begin{matrix} y=1 \\ \Rightarrow \end{matrix} x^2 + \frac{1}{9} + \frac{z^2}{9} = 1$ Una elipse
- $\begin{matrix} y=2 \\ \Rightarrow \end{matrix} x^2 + \frac{4}{9} + \frac{z^2}{9} = 1$ Una elipse
- • $\begin{matrix} x=-2 \\ \Rightarrow \end{matrix} 4 + \frac{y^2}{9} + \frac{z^2}{9} = 1$ Circulo
- $\begin{matrix} x=-1 \\ \Rightarrow \end{matrix} 1 + \frac{y^2}{9} + \frac{z^2}{9} = 1$ Circulo
- $\begin{matrix} x=0 \\ \Rightarrow \end{matrix} \frac{y^2}{9} + \frac{z^2}{9} = 1$ Circulo
- $\begin{matrix} x=1 \\ \Rightarrow \end{matrix} 1 + \frac{y^2}{9} + \frac{z^2}{9} = 1$ Circulo
- $\begin{matrix} x=2 \\ \Rightarrow \end{matrix} 4 + \frac{y^2}{9} + \frac{z^2}{9} = 1$ Circulo

2) $z = x^2 + y^2$

- • $\begin{matrix} z=0 \\ \Rightarrow \end{matrix} x^2 + y^2 = 0$ un punto
- $\begin{matrix} z=1 \\ \Rightarrow \end{matrix} x^2 + y^2 = 1$ Un circulo con centro en (0,0) y radio 1
- $\begin{matrix} z=2 \\ \Rightarrow \end{matrix} x^2 + y^2 = 2$ Un circulo con centro en (0,0) y radio $\sqrt{2}$
- • $\begin{matrix} y=-2 \\ \Rightarrow \end{matrix} x^2 + 4 = z$ Una parabola
- $\begin{matrix} y=-1 \\ \Rightarrow \end{matrix} x^2 + 1 = z$ Una parabola
- $\begin{matrix} y=0 \\ \Rightarrow \end{matrix} x^2 + 0 = z$ Una parabola
- $\begin{matrix} y=1 \\ \Rightarrow \end{matrix} x^2 + 1 = z$ Una parabola
- $\begin{matrix} y=2 \\ \Rightarrow \end{matrix} x^2 + 4 = z$ Una parabola
- • $\begin{matrix} x=-2 \\ \Rightarrow \end{matrix} 4 + y^2 = z$ Una parabola
- $\begin{matrix} x=-1 \\ \Rightarrow \end{matrix} 1 + y^2 = z$ Una parabola
- $\begin{matrix} x=0 \\ \Rightarrow \end{matrix} 0 + y^2 = z$ Una parabola
- $\begin{matrix} x=1 \\ \Rightarrow \end{matrix} 1 + y^2 = z$ Una parabola
- $\begin{matrix} x=2 \\ \Rightarrow \end{matrix} 4 + y^2 = z$ Una parabola

3) $x = y^2 + 4z^2$

- • $\begin{matrix} z=-2 \\ \Rightarrow \end{matrix} x = y^2 + 16$ Una parabola
- $\begin{matrix} z=-1 \\ \Rightarrow \end{matrix} x = y^2 + 4$ Una parabola
- $\begin{matrix} z=0 \\ \Rightarrow \end{matrix} x = y^2$ Una parabola

- $\stackrel{z=1}{\Rightarrow} x = y^2 + 4$ Una parabola
 - $\stackrel{z=2}{\Rightarrow} x = y^2 + 16$ Una parabola
 - • $\stackrel{y=-2}{\Rightarrow} x = 4 + 4z^2$ Una parabola
 - $\stackrel{y=-1}{\Rightarrow} x = 1 + 4z^2$ Una parabola
 - $\stackrel{y=0}{\Rightarrow} x = 0 + 4z^2$ Una parabola
 - $\stackrel{y=1}{\Rightarrow} x = 1 + 4z^2$ Una parabola
 - $\stackrel{y=2}{\Rightarrow} x = 4 + 4z^2$ Una parabola
 - • $\stackrel{x=0}{\Rightarrow} x = y^2 + 4z^2$ Un punto
 - $\stackrel{x=1}{\Rightarrow} 1 = y^2 + 4z^2$ Una elipse
 - $\stackrel{x=2}{\Rightarrow} 2 = y^2 + 4z^2$ Una elipse
- 4) $z^2 = x^2 + y^2$
- • $\stackrel{z=-2}{\Rightarrow} 4 = x^2 + y^2$ Un circulo con centro en (0,0) y radio $\sqrt{4}$
 - $\stackrel{z=-1}{\Rightarrow} 1 = x^2 + y^2$ Un circulo con centro en (0,0) y radio 1
 - $\stackrel{z=0}{\Rightarrow} 0 = x^2 + y^2$ Un punto
 - $\stackrel{z=1}{\Rightarrow} 1 = x^2 + y^2$ Un circulo con centro en (0,0) y radio 1
 - $\stackrel{z=2}{\Rightarrow} 4 = x^2 + y^2$ Un circulo con centro en (0,0) y radio $\sqrt{4}$
 - • $\stackrel{y=-2}{\Rightarrow} z^2 - x^2 = 4$ Hiperbola
 - $\stackrel{y=-1}{\Rightarrow} z^2 - x^2 = 1$ Hiperbola
 - $\stackrel{y=0}{\Rightarrow} z^2 - x^2 = 0$ Una X
 - $\stackrel{y=1}{\Rightarrow} z^2 - x^2 = 1$ Hiperbola
 - $\stackrel{y=2}{\Rightarrow} z^2 - x^2 = 4$ Hiperbola
 - • $\stackrel{x=-2}{\Rightarrow} z^2 - y^2 = 4$ Hiperbola
 - $\stackrel{x=-1}{\Rightarrow} z^2 - y^2 = 1$ Hiperbola
 - $\stackrel{x=0}{\Rightarrow} z^2 - y^2 = 0$ Una x
 - $\stackrel{x=1}{\Rightarrow} z^2 - y^2 = 1$ Hiperbola
 - $\stackrel{x=2}{\Rightarrow} z^2 - y^2 = 4$ Hiperbola
- 5) $x^2 = y^2 + 4z^2$
- • $\stackrel{z=-2}{\Rightarrow} x^2 = y^2 + 16$ Hiperbola
 - $\stackrel{z=-1}{\Rightarrow} x^2 = y^2 + 4$ Hiperbola
 - $\stackrel{z=0}{\Rightarrow} x^2 = y^2$ Un punto
 - $\stackrel{z=1}{\Rightarrow} x^2 = y^2 + 4$ Hiperbola
 - $\stackrel{z=2}{\Rightarrow} x^2 = y^2 + 16$ Hiperbola
 - • $\stackrel{y=-2}{\Rightarrow} x^2 = 4 + 4z^2$ Hiperbola
 - $\stackrel{y=-1}{\Rightarrow} x^2 = 1 + 4z^2$ Hiperbola
 - $\stackrel{y=0}{\Rightarrow} x^2 = 4z^2$ Una X
 - $\stackrel{y=1}{\Rightarrow} x^2 = 1 + 4z^2$ Hiperbola
 - $\stackrel{y=2}{\Rightarrow} x^2 = 4 + 4z^2$ Hiperbola
 - • $\stackrel{x=-2}{\Rightarrow} 4 = y^2 + 4z^2$ Un elipse
 - $\stackrel{x=-1}{\Rightarrow} 1 = y^2 + 4z^2$ Un elipse
 - $\stackrel{x=0}{\Rightarrow} 0 = y^2 + 4z^2$ Un punto
 - $\stackrel{x=1}{\Rightarrow} 1 = y^2 + 4z^2$ Un elipse
 - $\stackrel{x=2}{\Rightarrow} 4 = y^2 + 4z^2$ Un elipse
- 6) $z = x^2 - y^2$
- • $\stackrel{z=-2}{\Rightarrow} -2 = x^2 - y^2$ Hiperbola
 - $\stackrel{z=-1}{\Rightarrow} -1 = x^2 - y^2$ Hiperbola

- $\stackrel{z=0}{\Rightarrow} y^2 = x^2$ Ejes de 45°
- $\stackrel{z=1}{\Rightarrow} 1 = x^2 - y^2$ Hiperbola
- $\stackrel{z=2}{\Rightarrow} 2 = x^2 - y^2$ Hiperbola
- • $\stackrel{y=-2}{\Rightarrow} z = x^2 - 4$ Parabola
- $\stackrel{y=-1}{\Rightarrow} z = x^2 - 1$ Parabola
- $\stackrel{y=0}{\Rightarrow} z = x^2 - 0$ Parabola
- $\stackrel{y=1}{\Rightarrow} z = x^2 - 1$ Parabola
- $\stackrel{y=2}{\Rightarrow} z = x^2 - 4$ Parabola
- • $\stackrel{x=-2}{\Rightarrow} z = 4 - y^2$ Parabola
- $\stackrel{x=-1}{\Rightarrow} z = 1 - y^2$ Parabola
- $\stackrel{x=0}{\Rightarrow} z = 0 - y^2$ Parabola
- $\stackrel{x=1}{\Rightarrow} z = 1 - y^2$ Parabola
- $\stackrel{x=2}{\Rightarrow} z = 4 - y^2$ Parabola

7) $x^2 + y^2 - z^2 = 1$

- • $\stackrel{z=-2}{\Rightarrow} x^2 + y^2 - 4 = 1$ Circulo
- $\stackrel{z=-1}{\Rightarrow} x^2 + y^2 - 1 = 1$ Circulo
- $\stackrel{z=0}{\Rightarrow} x^2 + y^2 - 0 = 1$ Circulo
- $\stackrel{z=1}{\Rightarrow} x^2 + y^2 - 1 = 1$ Circulo
- $\stackrel{z=2}{\Rightarrow} x^2 + y^2 - 4 = 1$ Circulo
- • $\stackrel{y=-2}{\Rightarrow} x^2 + 4 - z^2 = 1$ Hiperbola
- $\stackrel{y=-1}{\Rightarrow} x^2 + 1 - z^2 = 1$ Hiperbola
- $\stackrel{y=0}{\Rightarrow} x^2 + 0 - z^2 = 1$ Hiperbola
- $\stackrel{y=1}{\Rightarrow} x^2 + 1 - z^2 = 1$ Hiperbola
- $\stackrel{y=2}{\Rightarrow} x^2 + 4 - z^2 = 1$ Hiperbola
- • $\stackrel{x=-2}{\Rightarrow} 4 + y^2 - z^2 = 1$ Hiperbola
- $\stackrel{x=-1}{\Rightarrow} 1 + y^2 - z^2 = 1$ Hiperbola
- $\stackrel{x=0}{\Rightarrow} 0 + y^2 - z^2 = 1$ Hiperbola
- $\stackrel{x=1}{\Rightarrow} 1 + y^2 - z^2 = 1$ Hiperbola
- $\stackrel{x=2}{\Rightarrow} 4 + y^2 - z^2 = 1$ Hiperbola

8) $-x^2 - y^2 + z^2 = 1$

- • $\stackrel{z=-2}{\Rightarrow} -x^2 - y^2 + 4 = 1$ Circulo
- $\stackrel{z=-1}{\Rightarrow} -x^2 - y^2 + 2 = 1$ Circulo
- $\stackrel{z=0}{\Rightarrow} -x^2 - y^2 + 1 = 1$ Circulo
- $\stackrel{z=1}{\Rightarrow} -x^2 - y^2 + 2 = 1$ Circulo
- $\stackrel{z=2}{\Rightarrow} -x^2 - y^2 + 4 = 1$ Circulo
- • $\stackrel{y=-2}{\Rightarrow} -x^2 - 4 + z^2 = 1$ Hiperbola
- $\stackrel{y=-1}{\Rightarrow} -x^2 - 2 + z^2 = 1$ Hiperbola
- $\stackrel{y=0}{\Rightarrow} -x^2 - 1 + z^2 = 1$ Hiperbola
- $\stackrel{y=1}{\Rightarrow} -x^2 - 2 + z^2 = 1$ Hiperbola
- $\stackrel{y=2}{\Rightarrow} -x^2 - 4 + z^2 = 1$ Hiperbola

- • $\overset{x=-2}{\Rightarrow} -4 - y^2 + z^2 = 1$ Hiperbola
- $\overset{x=-1}{\Rightarrow} -2 - y^2 + z^2 = 1$ Hiperbola
- $\overset{x=0}{\Rightarrow} -1 - y^2 + z^2 = 1$ Hiperbola
- $\overset{x=1}{\Rightarrow} -2 - y^2 + z^2 = 1$ Hiperbola
- $\overset{x=2}{\Rightarrow} -4 - y^2 + z^2 = 1$ Hiperbola

9) $4x^2 + 9y^2 + z = 0$

- • $\overset{z=-2}{\Rightarrow} 4x^2 + 9y^2 + (-2) = 0$ Elipse
- $\overset{z=-1}{\Rightarrow} 4x^2 + 9y^2 + (-1) = 0$ Elipse
- $\overset{z=0}{\Rightarrow} 4x^2 + 9y^2 = 0$ Elipse
- $\overset{z=1}{\Rightarrow} 4x^2 + 9y^2 + 1 = 0$ Elipse
- $\overset{z=2}{\Rightarrow} 4x^2 + 9y^2 + 2 = 0$ Elipse

- • $\overset{y=-2}{\Rightarrow} 4x^2 + 18 + z = 0$ Parabola
- $\overset{y=-1}{\Rightarrow} 4x^2 + 9 + z = 0$ Parabola
- $\overset{y=0}{\Rightarrow} 4x^2 + z = 0$ Parabola
- $\overset{y=1}{\Rightarrow} 4x^2 + 9 + z = 0$ Parabola
- $\overset{y=2}{\Rightarrow} 4x^2 + 18 + z = 0$ Parabola

- • $\overset{x=-2}{\Rightarrow} 16 + 9y^2 + z = 0$ Elipse
- $\overset{x=-1}{\Rightarrow} 4 + 9y^2 + z = 0$ Elipse
- $\overset{x=0}{\Rightarrow} 9y^2 + z = 0$ Elipse
- $\overset{x=1}{\Rightarrow} 4 + 9y^2 + z = 0$ Elipse
- $\overset{x=2}{\Rightarrow} 16 + 9y^2 + z = 0$ Elipse

b) 1)