125.1b

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

$$y_0=0\Rightarrow\frac{x^2}{a^2}-\frac{z^2}{c^2}=1$$

$$\alpha(t)=(a\cosh t,0,c\sinh t)$$

Rotação em z

$$z=c\sinh t_0\Rightarrow\frac{x^2}{a^2}+\frac{y^2}{b^2}=1+\sinh^2 t_0=\cosh^2 t_0\Rightarrow\begin{pmatrix}x\\y\end{pmatrix}=\begin{pmatrix}a\cos\theta\\b\sin\theta\end{pmatrix}\cosh t,\theta\in[0,2\pi)$$

$$\therefore\phi\begin{pmatrix}t\\\theta\end{pmatrix}=\begin{pmatrix}a\cosh t\cos\theta\\b\cosh t\sin\theta\\c\sinh t\end{pmatrix};\phi\begin{pmatrix}0\\\theta\end{pmatrix}=\begin{pmatrix}a\cos\theta\\b\sin\theta\\0\end{pmatrix};\phi\begin{pmatrix}t\\0\end{pmatrix}=\begin{pmatrix}a\cosh t\\0\\c\sinh t\end{pmatrix}$$

125.1c

$$\frac{x^2}{a^2}-\frac{y^2}{b^2}-\frac{z^2}{c^2}=1$$

$$z_0=0\Rightarrow\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$$

$$\alpha(\theta)=(a\operatorname{cossec}\theta,b\cot\theta,0),\theta\in(0,\pi)\cup(\pi,2\pi)=I$$

Rotação em x

$$x=a\operatorname{cossec}\theta_0\Rightarrow\frac{y^2}{b^2}+\frac{z^2}{c^2}=\operatorname{cossec}^2\theta_0-1=\cot^2\theta_0$$

$$\begin{pmatrix}y\\z\end{pmatrix}=\begin{pmatrix}b\cos\lambda\\c\sin\lambda\end{pmatrix}\cot\theta\xrightarrow{\lambda=0}\begin{pmatrix}a\operatorname{cossec}\theta\\b\cot\theta\\0\end{pmatrix}$$

$$\therefore\phi\begin{pmatrix}\theta\\\lambda\end{pmatrix}=\begin{pmatrix}a\operatorname{cossec}\theta\\b\cot\theta\cos\lambda\\c\cot\theta\sin\lambda\end{pmatrix}=\frac{1}{\sin\theta}\begin{pmatrix}a\\b\cos\theta\cos\lambda\\c\cos\theta\sin\lambda\end{pmatrix}=\cot\theta\begin{pmatrix}a\sec\theta\\b\cos\lambda\\c\sin\lambda\end{pmatrix}$$

125.1d

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

$$x_0 = 0 \Rightarrow z = \pm y$$

$$\alpha(t) = (0, t, t)$$

Rotação em z

$$z = t_0 \Rightarrow x^2 + y^2 = t_0^2 \Rightarrow \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} \cos\theta \\ \sin\theta \end{pmatrix} t \xrightarrow{\theta = \frac{\pi}{2}} \begin{pmatrix} 0 \\ t \\ t \end{pmatrix}$$

$$\therefore \phi\begin{pmatrix} t \\ \theta \end{pmatrix} = t\begin{pmatrix} \cos\theta \\ \sin\theta \\ 1 \end{pmatrix}, \theta \in (0, 2\pi); \phi\begin{pmatrix} t \\ \pi \end{pmatrix} = t\begin{pmatrix} -1 \\ 0 \\ 1 \end{pmatrix}; \phi\begin{pmatrix} \pi \\ \theta \end{pmatrix} = \pi\begin{pmatrix} \cos\theta \\ \sin\theta \\ 1 \end{pmatrix}$$