$$\mathbb{C} \cup \infty = \frac{\frac{z}{w}}{z \in \mathbb{C} \ni w: \quad z \neq 0 \vee w \neq 0}$$

$$(S) = \frac{z \in \bar{\mathbb{C}}}{\begin{bmatrix} 1 & z^* \end{bmatrix} \begin{array}{c|c} d & b^* \\ \hline b & a \end{array} \begin{bmatrix} 1 \\ z \end{bmatrix} = az^*z + bz^* + b^*z + d = 0}$$

$$\text{circle } r^2 = \ulcorner z + b \urcorner^2 = z\,z^* + b^* z + b\,z^* + b^* b \Longrightarrow a = 1$$

$$d = b^* b - r^2 \Longrightarrow b^* b - ad = r^2 > 0$$

$$\text{line } Ax + By + d = 0 \Longrightarrow b = \frac{A + iB}{2} \wedge z\,b^* + z^* b + d = 0 \wedge a = 0 \Longrightarrow b^* b - ad = \frac{A^2 + B^2}{4} > 0$$

$$\text{converse } a\,z^* z + b\,z^* + b^* z + d = 0 \Longrightarrow \begin{cases} A = b + b^* \wedge B = \left(b - b^*\right)/i & a = 0 \\ o = -b/a \wedge r^2 = o^2 - d/a = \dfrac{b^* b - ad}{a^2} > 0 & a \neq 0 \end{cases}$$

$$\bar{\mathbb{R}} = \begin{array}{c|c} 0 & i \\ \hline -i & 0 \end{array}$$

$$i\,\bar{\mathbb{R}} = \begin{array}{c|c} 0 & -1 \\ \hline -1 & 0 \end{array}$$

$$\mathbb{T} = \begin{array}{c|c} -1 & 0 \\ \hline 0 & 1 \end{array}$$