

# CLASIFICACIÓN

## CÓNICAS EN UN PLANO afín

	Tipo (I) $R_H = r_H = 1$	Tipo (I) $R_H = r_H = 2$	Tipo (II) $R_H = r_H + 1 = 2$	Tipo (II) $R_H = r_H + 1 = 3$	Tipo (III) $R_H = r_H + 2 = 3$
$S_H = s_H = 0$		Rectas secantes			
$S_H = s_H = 1$	Recta doble				Parábola
$S_H = s_H = 2$		Punto			
$S_H = s_H - 1 = 0$			Rectas paralelas		
$S_H = s_H - 1 = 1$				Elipse	
$S_H = s_H + 1 = 3$				Vacío	
$S_H = s_H + 1 = 1$				Hipérbola	
$S_H = s_H + 1 = 2$			Vacío		

Recta doble $\begin{pmatrix} 0 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{pmatrix}$	Punto $\begin{pmatrix} 0 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	Rectas secantes $\begin{pmatrix} 0 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	Vacío $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{pmatrix}$	Rectas paralelas $\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 0 \end{pmatrix}$	Hipérbola $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	Elipse $\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	Parábola $\begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$
Tipo I			Tipo II			Tipo III	

## CÓNICAS EN UN ESPACIO afín TRIDIMENSIONAL

Tipo (I)	$R_H = r_H = 1$	$R_H = r_H = 2$	$R_H = r_H = 3$
$S_H = s_H = 0$		Planos secantes	
$S_H = s_H = 1$	Plano doble		Cono
$S_H = s_H = 2$		Recta	
$S_H = s_H = 3$			Punto

Plano doble $\begin{pmatrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}$	Recta $\begin{pmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}$	Planos secantes $\begin{pmatrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}$
Punto $\begin{pmatrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$	Cono $\begin{pmatrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & -1 \end{pmatrix}$	

Tipo (II)	$R_H = r_H + 1 = 2$	$R_H = r_H + 1 = 3$	$R_H = r_H + 1 = 4$
$S_H = s_H + 1 = 1$		Cilindro hiperbólico	
$S_H = s_H + 1 = 2$	vacío		Hiperboloide de dos hojas
$S_H = s_H + 1 = 3$		vacío	
$S_H = s_H + 1 = 4$			vacío
$S_H = s_H - 1 = 0$	Planos paralelos		Hiperboloide de una hoja
$S_H = s_H - 1 = 1$		Cilindro elíptico	
$S_H = s_H - 1 = 2$			Elipsoide

Planos paralelos $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}$	Cilindro hiperbólico $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}$	Cilindro elíptico $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}$	Hiperboloide de 2 hojas $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & -1 \end{pmatrix}$	Hiperboloide de 1 hoja $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & -1 \end{pmatrix}$	Elipsoide $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & -1 \end{pmatrix}$	Vacío $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$
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Tipo (III)	$R_H = r_H + 2 = 3$	$R_H = r_H + 2 = 4$
$S_H = s_H = 0$		Paraboloide hiperbólico
$S_H = s_H = 1$	Cilindro parabólico	
$S_H = s_H = 2$		Paraboloide elíptico

Cilindro parabólico $\begin{pmatrix} 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{pmatrix}$	Paraboloide elíptico $\begin{pmatrix} 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \end{pmatrix}$	Paraboloide hiperbólico $\begin{pmatrix} 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 1 & 0 & 0 & 0 \end{pmatrix}$
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