

③ A Verificar la estabilidad del sig. filtro:

$$H(z) = \frac{z^6}{(\underbrace{6z^6}_{a_6} + \underbrace{5z^5}_{a_5} + \underbrace{4z^4}_{a_4} + \underbrace{3z^3}_{a_3} + \underbrace{2z^2}_{a_2} + \underbrace{1z}_{a_1} + \underbrace{1}_{a_0})} f(z)$$

el filtro es estable \Leftrightarrow no tiene polos con $|z| = 1$

utilizaremos el método de Jury-Marden:

$$M_1 = \begin{bmatrix} a_6 & a_5 & \dots & a_1 & a_0 \\ 0 & a_6 & & & a_1 \\ 0 & & 0 & & \vdots \\ \vdots & & & & a_5 \\ 0 & 0 & \dots & & a_0 \end{bmatrix} = \begin{bmatrix} 6 & 5 & 4 & 3 & 2 & 1 \\ 0 & 6 & 5 & 4 & 3 & 2 \\ 0 & 0 & 6 & 5 & 4 & 3 \\ 0 & 0 & 0 & 6 & 5 & 4 \\ 0 & 0 & 0 & 0 & 6 & 5 \\ 0 & 0 & 0 & 0 & 0 & 6 \end{bmatrix}$$

$$M_2 = \begin{bmatrix} a_6 & a_5 & \dots & a_1 & a_0 \\ a_5 & \dots & a_0 & 0 \\ \vdots & & & \vdots \\ a_0 & 0 & \dots & 0 \end{bmatrix} = \begin{bmatrix} 6 & 5 & 4 & 3 & 2 & 1 \\ 5 & 4 & 3 & 2 & 1 & 0 \\ 4 & 3 & 2 & 1 & 1 & 0 \\ 3 & 2 & 1 & 1 & 0 & 0 \\ 2 & 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$H = M_1 + M_2 = \begin{bmatrix} 12 & 10 & 8 & 6 & 4 & 2 & 2 \\ 5 & 10 & 8 & 6 & 4 & 3 & 1 \\ 4 & 3 & 8 & 6 & 5 & 3 & 2 \\ 3 & 2 & 1 & 7 & 5 & 4 & 3 \\ 2 & 1 & 1 & 0 & 6 & 5 & 4 \\ 1 & 1 & 0 & 0 & 0 & 6 & 5 \\ 1 & 0 & 0 & 0 & 0 & 0 & 6 \end{bmatrix}$$

$$\Delta H_1 = 7 > 0$$

$$\Delta H_3 = \begin{vmatrix} 8 & 6 & 5 \\ 1 & 7 & 5 \\ 1 & 0 & 6 \end{vmatrix} = 295 > 0$$

$$\Delta H_5 = 12383 > 0$$

$$\Delta H_7 = 507408 > 0$$

\Rightarrow el sistema es estable