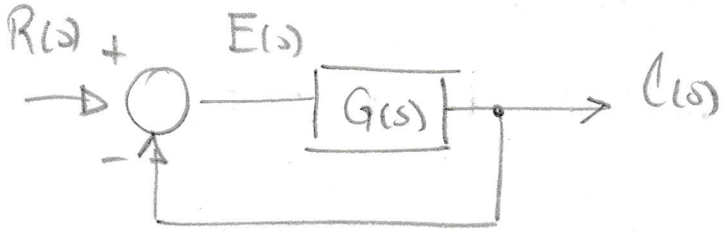
3 Problema

$$G(s) = \frac{K(1+s)^2}{s^3}$$

Criterio de Routh



En retroalimentación negativa con H = 1

La función de transferencia es

$$E(s) = R(s) - C(s) \qquad C(s) = E(s)\,G(s)$$

$$E(s) = R(s) - E(s)G(s)$$

$$E(s)[1 + G(s)] = R(s)$$

$$E(s) = \frac{R(s)}{1+G(s)} \quad \therefore \quad C(s) = \frac{R(s)}{1+G(s)} \cdot G(s)$$

Sustituyendo $\leftarrow$ $\dfrac{C(s)}{R(s)} = \dfrac{G(s)}{1+G(s)}$

$$\frac{C(s)}{R(s)} = \frac{\dfrac{K(1+s)^2}{s^3}}{1 + \dfrac{K(1+s)^2}{s^3}}$$

$$\frac{C(s)}{R(s)} = \frac{\dfrac{K(1+s)^2}{\cancel{s^3}}}{\dfrac{s^3 + K(1+s)^2}{\cancel{s^3}}} = \frac{K(1+s)^2}{s^3 + K(1+s)^2}$$

$$\frac{C(s)}{R(s)} = \frac{K(1+s)^2}{s^3 + K(1+2s+s^2)} = \frac{K(1+s)^2}{s^3 + Ks^2 + 2Ks + K}$$

Ecuación Característica

Problema 3 Sea $\frac{C(s)}{R(s)} = \frac{K(1+s)^2}{s^3 + Ks^2 + 2Ks + K}$

- Aplicando el criterio de Routh

$$s^3 + Ks^2 + 2Ks + K = 0$$

- Se escribe la tabla de Routh

s^3	1	$2K$
s^2	K	K
s^1	$2K-1$	
s^0	K	

Para $s^1 = \frac{K \cdot 2K - K}{K} = \frac{\cancel{K}(2K-1)}{\cancel{K}} = 2K-1$

Para $s^0 = \frac{\cancel{(2K-1)}K - K \cdot 0}{\cancel{2K-1}} = K$

Para que el sistema sea estable K debe ser positivo y todos los coeficientes de la primera columna también.

de s^0 $K > 0$

de s^2 $K > 0$

de s^1 $2K - 1 > 0$

$2K > 1$

$K > 1/2$

$\therefore \forall K > 1/2$ el sistema es estable