TP7-1: Bode.

Ejercicio 4: (a) $G(s)H(s) = 2\,\frac{s+1}{s^2(s+2)}$ fase mínima.

(b) $G(s)H(s) = 2\,\frac{s-1}{s^2(s+2)}$ fase no mínima.

(a) $G(s)H(s) = \frac{2^{1}}{s^2\,2(0,5s+1)} = \frac{s+1}{s^2(0,5+1)}$. Formato Bode.

$$G(j\omega)H(j\omega) = \frac{1+j\omega}{(-\omega^2)(1+j0,5\omega)} \;;\; |G(j\omega)H(j\omega)| = \frac{|1+j\omega|}{|-\omega^2|\,|1+j0,5\omega|}.$$

$$|G(j\omega)H(j\omega)| = \frac{\sqrt{1+\omega^2}}{\omega^2\sqrt{1+0,25\omega^2}}$$

$$* \; |G(j\omega)H(j\omega)|_{dB} = 10\log(1+\omega^2) - 40\log\omega - 10\log(1+0,25\omega^2)$$

(b) $G(s)H(s) = \frac{2^{1}(-1)(-s+1)}{s^2\,2(0,5s+1)} = \frac{(-1)(-s+1)}{s^2(0,5s+1)}$, Bode.

$$G(j\omega)H(j\omega) = \frac{(-1)(1-j\omega)}{(-\omega^2)(1+j0,5\omega)} \;;\; |G(j\omega)H(j\omega)| = \frac{|-1|\,|1+j\omega|}{|-\omega^2|\,|1+j0,5\omega|}.$$

$$|G(j\omega)H(j\omega)|_{dB} = 20\log 1 + 10\log(1+\omega^2) - 40\log\omega - 10\log(1+0,25\omega^2)$$

$$* \; |G(j\omega)H(j\omega)|_{dB} = 10\log(1+\omega^2) - 40\log\omega - 10\log(1+0,25\omega^2)$$

* expresiones idénticas mismo módulo.

Fase sistema (a)

$$|G(j\omega)H(j\omega)| = |1+j\omega| - |-\omega^2| - |1+j0{,}5\omega|$$

$$\angle G(j\omega)H(j\omega) = tg^{-1}\omega - tg^{-1}\left(\frac{-\omega^2}{0}\right)^{-1} - tg^{-1}0{,}5\omega$$

$$\angle G(j\omega)H(j\omega) = tg^{-1}\omega - 180^\circ - tg^{-1}0{,}5\omega$$

Fase Sistema (b):

$$|G(j\omega)H(j\omega)| = |-1| + |1-j\omega| - |-\omega^2| - |1+j0{,}5\omega|$$

$$\angle G(j\omega)H(j\omega) = tg^{-1}\left(\frac{0}{-1}\right) + tg^{-1}(-\omega) - 180^\circ - tg^{-1}0{,}5\omega$$

$$\angle G(j\omega)H(j\omega) = \cancel{180^\circ} - tg^{-1}\omega - \cancel{180^\circ} - tg^{-1}0{,}5\omega$$

$$\angle G(j\omega)H(j\omega) = -tg^{-1}\omega - tg^{-1}0{,}5\omega$$

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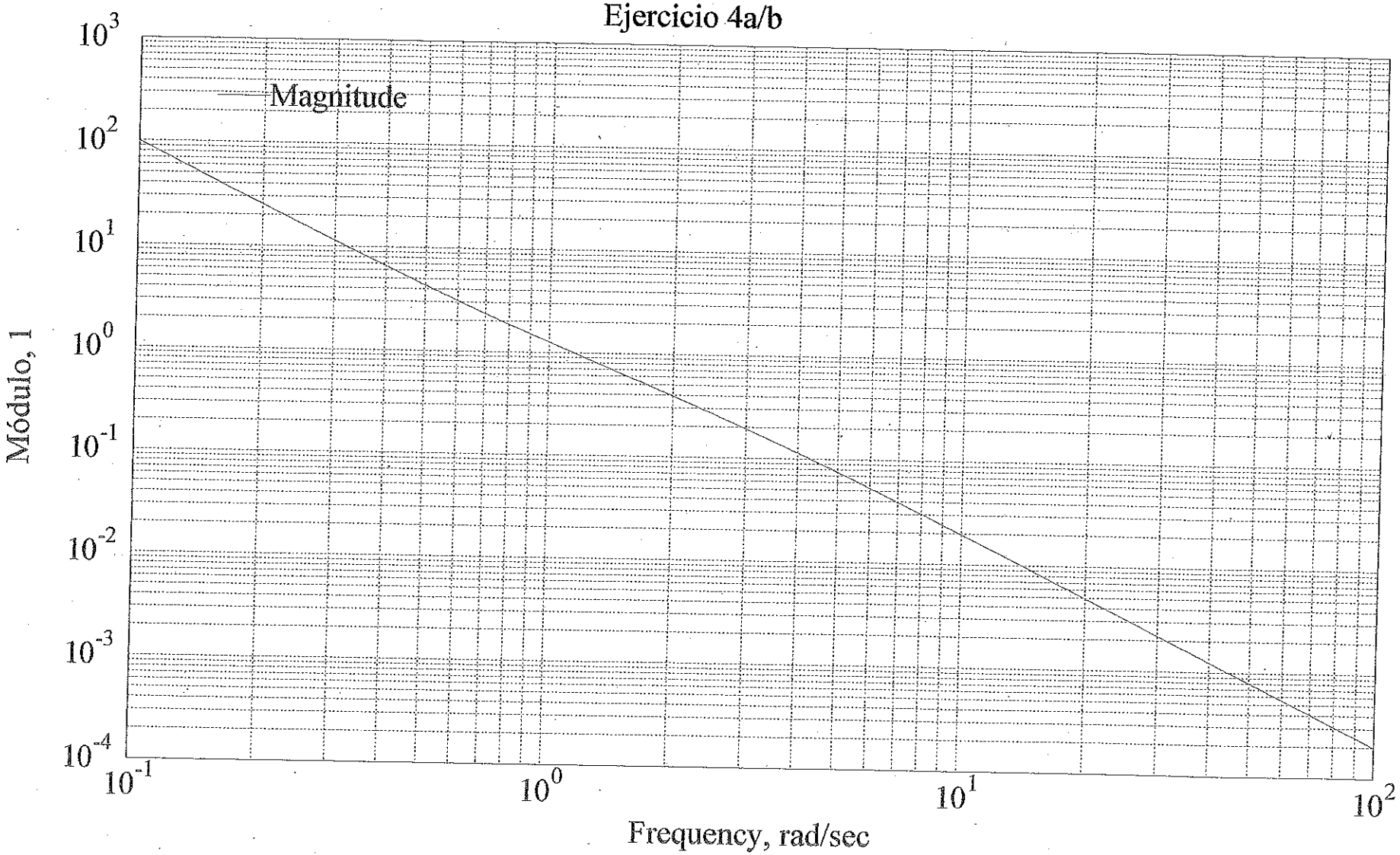
Ejercicio 4a/b



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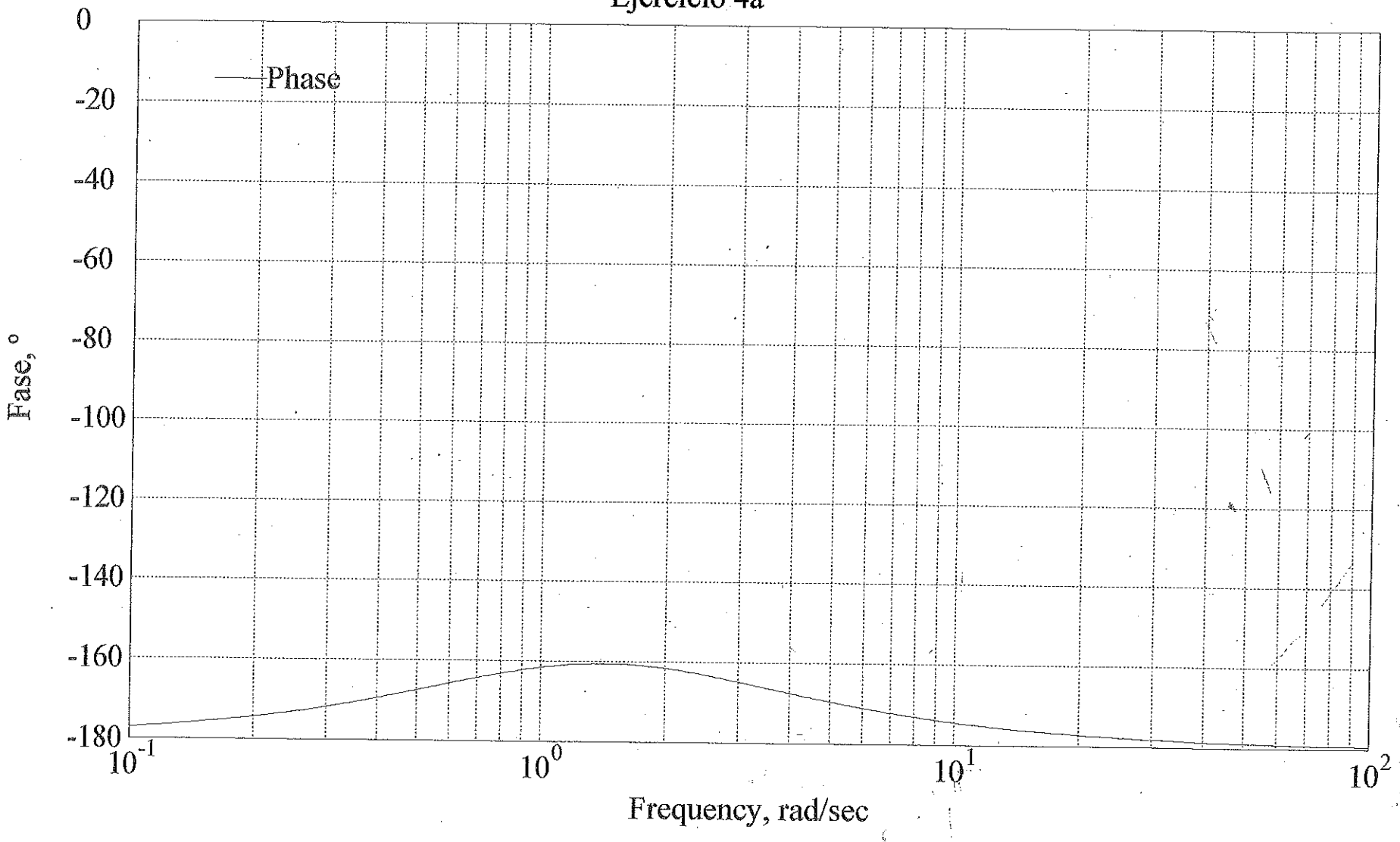
Ejercicio 4a



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Ejercicio 4b