$$G(s) = \frac{10(s+1)}{s(s+10)}$$

$$G(s) = \frac{10(s+1)}{10s\left(\frac{s}{10}+1\right)} = \frac{s+1}{s\left(\frac{s}{10}+1\right)} \Rightarrow G(j\omega) = \frac{j\frac{\omega}{1}+1}{j\frac{\omega}{1}\left(j\frac{\omega}{10}+1\right)}$$

(2) (1) (3)

$k=1 \Rightarrow k_{db} = 20 \log 1 = 0\ db$

(1) Polo en el origen $\left(\frac{1}{s}\right)$

Modulo

$$M_{db} = 20 \log\left|\frac{1}{j\frac{\omega}{1}}\right| = 20 \log 1 - 20 \log \frac{\omega}{1} = -20 \log \frac{\omega}{1}$$

p/ $\omega \ll 1$ (por ejemplo $\omega = 0{,}1 = \frac{1}{10}$) $\Rightarrow M_{db} = -20 \log \frac{1}{10} = -20 \log 1 + 20 \log 10$

$\boxed{M_{db} = 20\ db}$ p/ $\omega \ll 1$

p/ $\omega = 1 \Rightarrow M_{db} = -20 \log 1 = \boxed{0\ db = M_{db}}$ p/ $\omega = 1$

p/ $\omega \gg 1 \Rightarrow M_{db} = -20 \log 10 = \boxed{-20\ db = M_{db}}$ p/ $\omega \gg 1$

(por ej. $\omega = 10$)

Fase

$$\varphi = -\operatorname{tg}^{-1}\frac{\omega}{0} = -\operatorname{tg}^{-1}\infty = -90°$$

MODULO

(2) $(s+1) \equiv j\frac{\omega}{1} + 1$

$$M_{db} = 20 \log\left|j\frac{\omega}{1}+1\right| = 20 \log\sqrt{\frac{\omega^2}{1}+1}$$

p/ $\omega \ll 1$ (por ejemplo una década)

($\omega = 0{,}1$)

$$M_{db} = 20 \log 1 = \boxed{0\ db = M_{db}}$$

p/ $\omega \gg 1$:

$$M_{db} = 20 \log \sqrt{\omega^2} = 20 \log \frac{\omega}{1}$$

p/ $\omega = 1$ $M_{db} = 0$ db

p/ $\omega = 10$ $M_{db} = 20$ db

p/ $\omega = 100$ $M_{db} = 40$ db

⋮

FASE

$$\varphi = \operatorname{tg}^{-1} \frac{\omega}{1} = \operatorname{tg}^{-1} \omega$$

p/ $\omega \ll$ ($\omega = 0{,}1$) $\Rightarrow \varphi = \operatorname{tg}^{-1} \frac{1}{10} = \operatorname{tg}^{-1} 0{,}1 \simeq \boxed{0°}$

p/ $\omega \gg 1 \Rightarrow \varphi = \operatorname{tg}^{-1} \infty = \boxed{90°}$

p/ $\omega = 1 \Rightarrow \varphi = \operatorname{tg}^{-1} 1 = \boxed{45°}$

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③ $\dfrac{1}{\frac{s}{10} + 1}$

Modulo

$$M_{db} = 20 \log \left| \frac{1}{j\frac{\omega}{10} + 1} \right| = 20 \log 1 - 20 \log \sqrt{\left(\frac{\omega}{10}\right)^2 + 1}$$

($20 \log 1 = 0$)

p/ $\omega \ll 1$ $M_{db} = -20 \log 1 = \underline{0\ db}$

p/ $\omega \gg 1$ $M_{db} = -20 \log \frac{\omega}{10}$

$\omega = 10 \rightarrow \underline{M_{db} = 0\ db}$

$\omega = 100 \rightarrow \underline{M_{db} = -20\ db}$

$\omega = 1000 \rightarrow M_{db} = -40\ db$

⋮

FASE

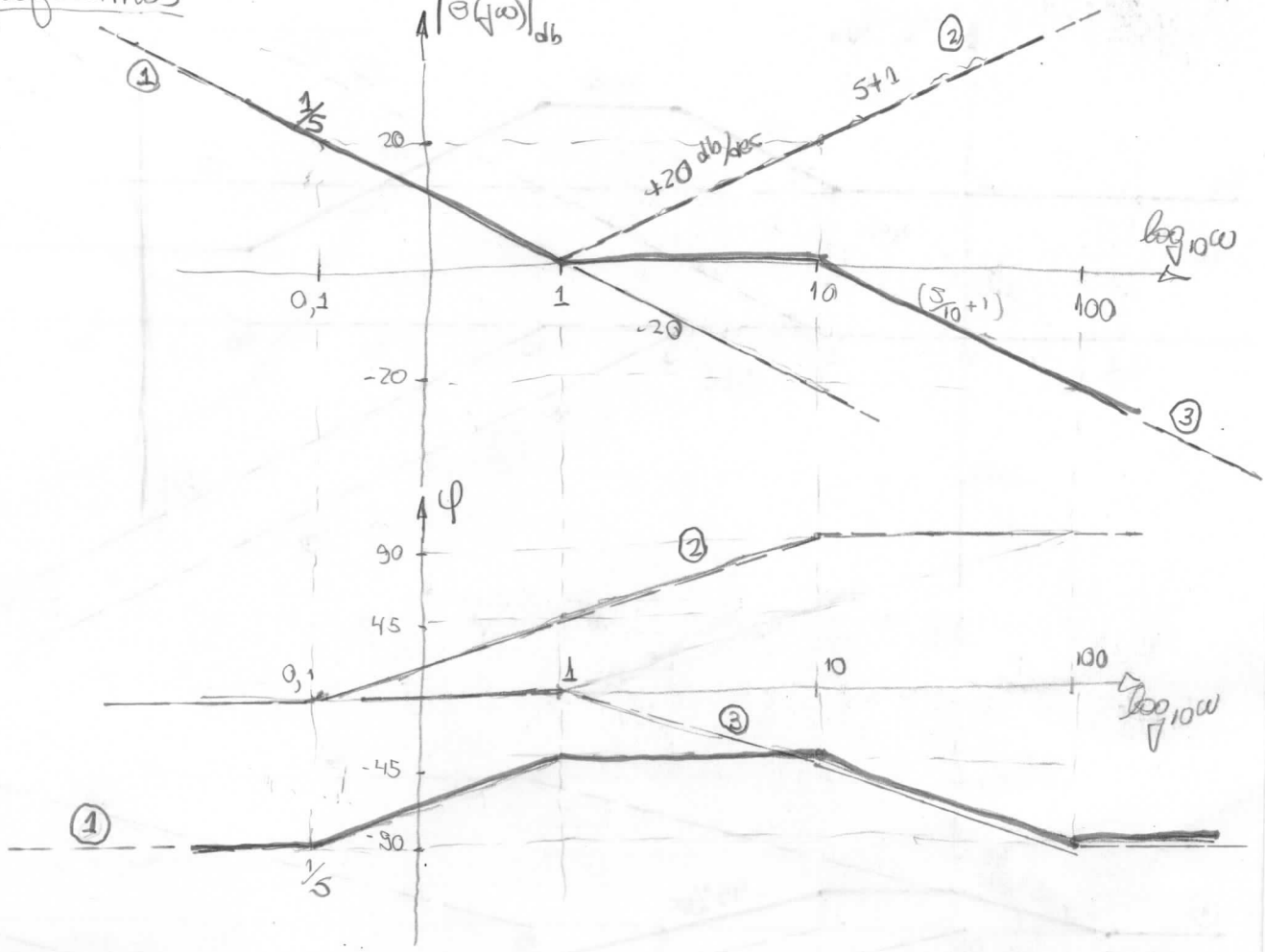
$$\varphi = -\operatorname{tg}^{-1} \frac{\omega}{10}$$

p/ $\omega \ll 10$ (por ej. 1 década) $\varphi = \operatorname{tg}^{-1} \ll \simeq 0°$

p/ $\omega \gg 10$ (1 década) $\varphi = -\operatorname{tg}^{-1} \infty \simeq -90°$

p/ $\omega = 10$ $\varphi = -\operatorname{tg}^{-1} 1 = -45°$

graficamos


$|\Theta(j\omega)|_{db}$
①
$\frac{1}{5}$
20
-20
0,1
1
10
100
$\frac{s}{10}+1$
②
$s+1$
+20 db/dec
③
$\log_{10}\omega$
φ
90
45
-45
-90
$\frac{1}{5}$