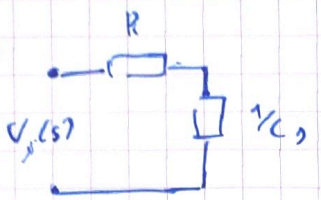
2.

2.1



$$V_o(s) = \left(\frac{V_i(s)}{R + 1/Cs}\right) \cdot \frac{1}{Cs} =$$

$$= \frac{V_i(s)}{CsR + 1} \Rightarrow \boxed{H(s) = \frac{1}{1+CRs}} =$$

$$= \boxed{\frac{1}{1 + s \cdot 10^{-4}}}$$

2.2

$$V_o(s) = \frac{2}{s(1+10^{-4}s)} = \frac{2 \cdot 10^4}{s(10^4+s)} = \frac{A}{s} + \frac{B}{10^4+s} = \frac{2}{s} + \frac{?}{10^4}$$

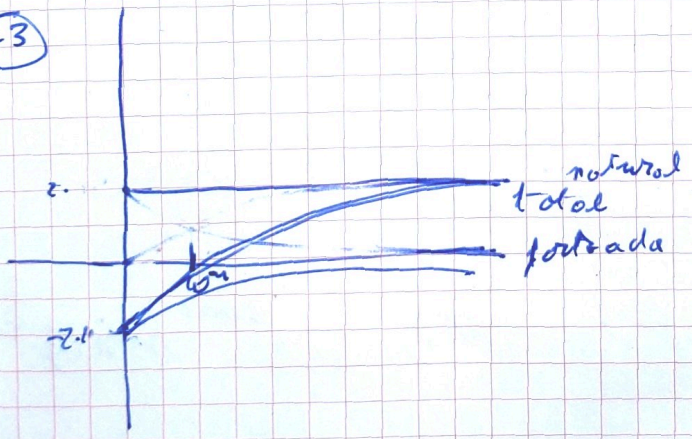
$$A = \left.\frac{2 \cdot 10^4}{s(s+10^4)}\right|_{s=0} = \frac{2 \cdot 10^4}{10^4} = 2$$

$$A + B = 0$$

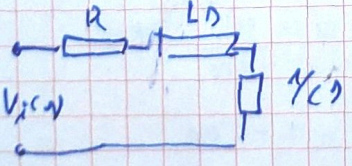
$$B = \left.\frac{2 \cdot 10^4}{(s+10^4) \cdot s}(s+10^4)\right|_{s=-10^4} = -2$$

$$\boxed{V_o(t) = 2 \cdot u(t) - 2 \cdot e^{-10^4 t}}$$

2.3



2.4



$$H(s) = \frac{1}{Cs(R + Ls + \frac{1}{Cs})} = \frac{1}{(RCs + LCs^2 +$$

$$= \frac{10^4}{(R+0,1s+10^4)}$$

(2.5) $H(s) = \frac{\dots 10^9}{(10^3 R s + s^2 + 10^9)} = \frac{10^{10}}{((s+5R)^2 + 10^9 - (5R)^2)}$

$10^9 - (5R)^2 \neq 0 \Rightarrow 10^9 - 25R^2 = 0$

$R^2 = \sqrt{\frac{10^9}{25}} = 6{,}3\ K\Omega$

$R \neq 6{,}3\ K\Omega \Rightarrow$ Respuesta sinusoidal exp

(2.6) $Y(s) = \frac{2}{s} \cdot \frac{10^{10}}{s^2 + 1000s + 10^9} = \frac{A}{s} + \frac{Bs + C}{s^2 + 1000s + 10^9} =$

$A + B = 0$

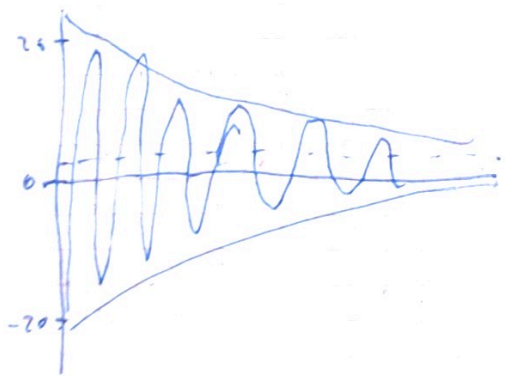
$1000A + C = 0$

$A = 20 \Rightarrow C = -20000 \Rightarrow B = -20$

$= \frac{2}{s} - 20 \frac{s + 1000}{s^2 + 1000s + 10^9} \simeq \frac{2}{s} - 20 \frac{s + 500}{(s+500)^2 + 10^9} - \sqrt{10} \frac{10^{4,5}}{(s+500)^2 + 10^9}$

$y_0(t) = 2 \cdot u(t) - 20 e^{-500t} \cos(10^{4,5} t) - \sqrt{10} e^{-500t} \sin(10^{4,5} t)$

(2.7)



$\omega = \frac{10^{4,5}}{2\pi}$ Hz

$\alpha = -500$