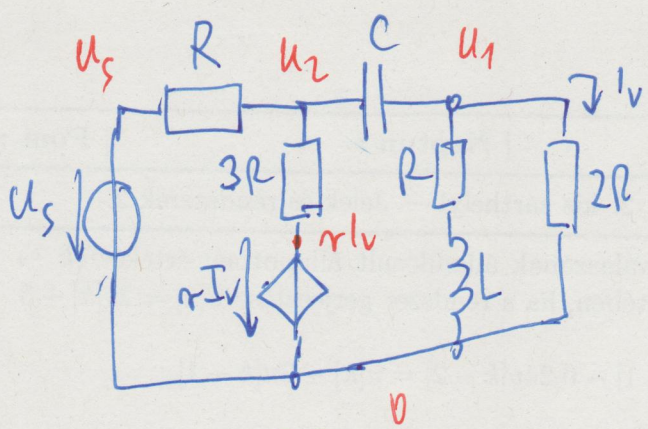


X.1

2.)

$$\frac{U_1}{2R} + \frac{U_1}{R+sL} + \frac{U_1 - U_2}{1/sC} = 0$$

$$sC(U_2 - U_1) + \frac{U_2 - rI_V}{3R} + \frac{U_2 - U_s}{R} = 0$$

$$I_V = \frac{U_1}{2R}$$

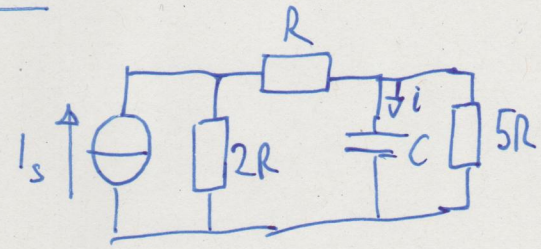
$R = 1 \qquad C = 0{,}1$

$L = 2 \qquad r = 0{,}5$

$$H(s) = \frac{12s^2 + 61}{42s^2 + 193s + 240}$$

- szimbolikus megoldás
- impulzusválasz az adott paraméterekre
- ugrásválasz és ábrázolás

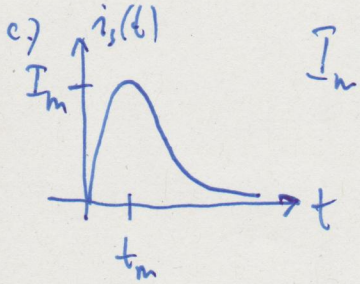
1.)



$R = 3\,k\Omega$; $C = 10\,nF$; L: ...

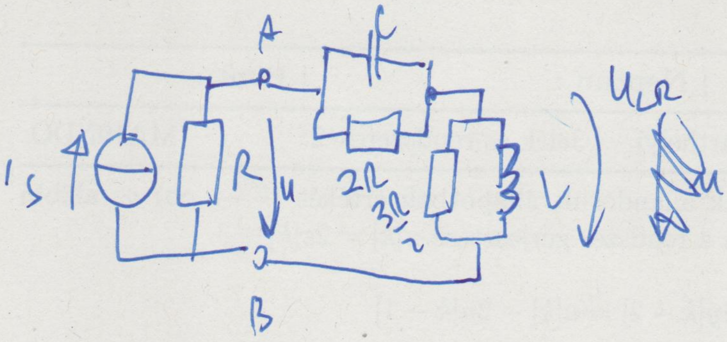
$k\Omega, nF, \mu s, mH, V, mA, M rad/s$

c.)



$I_m = 20\,mA$

$t_m = 50\,\mu s$



$L = 1$; $R = 2$

$\sqrt{\frac{L}{C}} = R \rightarrow C = \frac{L}{R^2} = \frac{1}{4}$

$$Z_{AB}(s) = \left(2R \times \frac{1}{sC}\right) + \left(\frac{3R}{2} \times sL\right)$$

$$U_{AB} = \frac{Z_{AB}}{R + Z_{AB}} \cdot R I_s$$

$$U_{AB} = \frac{s^2\, 6CLR^2 + 7LR \cdot s + 6R^2}{10\,CLR \cdot s^2 + (6CR^2 + 9L)s + 9R} I_s$$

fentiekkel

$$Z_{AB} = \frac{\dots}{(1 + 2RC)(s2L + 3R)}$$

$$\frac{6s^2 + 14s + 24}{5s^2 + 15s + 18}$$

másodrendű jó rendszer pólusai (ha lengő jellegű)

$s^2 + 2\xi\Omega s + \Omega^2$ alakú a nevező

$$10\,CLR \cdot \left(s^2 + s\left(\frac{6R}{10L} + \frac{9}{10RC}\right) + \underbrace{\frac{9}{10LC}}_{\Omega^2}\right)$$

$\Omega = \sqrt{\frac{9}{10LC}}$ pl. adott

(ha $\sqrt{\frac{L}{C}} = k \cdot R_0$ adott R_0 és Ω meghatározza L és C értékét)

ebből $\frac{6R}{10L} + \frac{9}{10RC} = 2 \cdot \xi_i \cdot \Omega$

$$\frac{6R}{10} + \frac{9}{10R}\frac{L}{C} = 2 \cdot \xi_i \cdot L \cdot \sqrt{\frac{9}{10LC}} = 2\xi_i \cdot \sqrt{\frac{9}{10}} \cdot \sqrt{\frac{L}{C}}$$

$R = 2$; $L = 1$, $C = 1$

X.2

$$U_{LR} = U_{AB} \cdot \frac{Z_{LR}}{Z_{LR} + Z_{RC}} \qquad R=2 \; ; \; L=1 \; ; \; C=1$$

$$\frac{2s^2 + 6s}{20s^2 + 33s + 18}$$

$$20\left(s^2 + 1{,}65s + 0{,}9\right)$$

$$\Omega^2 = 0{,}9 \rightarrow \Omega = 0{,}9486$$

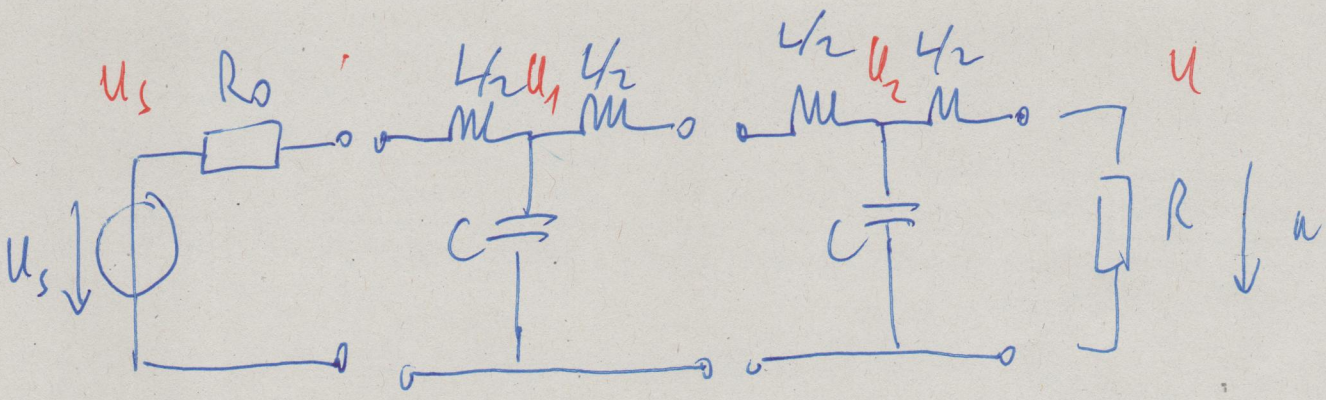
$$2\zeta \cdot \Omega = 1{,}65$$

$$\zeta = \frac{1{,}65}{2 \cdot \Omega} = 0{,}8617$$

$$H(s) = \frac{1}{s^2 CLR + s(L + 2C\Omega^2) + 3\Omega}$$

$R=1;\ L=1;\ C=1$ $\quad \frac{1}{s^2+3s+3}$ $\quad -1{,}5 \pm 0{,}8660j = p_{1,2}$

$R=5;\ L=1;\ C=1$ $\quad \frac{1}{5s^2+5s+15}$ $\quad -9{,}8969$
$\quad -0{,}3031$



0

$$\sqrt{\frac{L}{C}} = 120\Omega$$

$L = 1$

$$C = \frac{L}{(120\pi)^2}$$

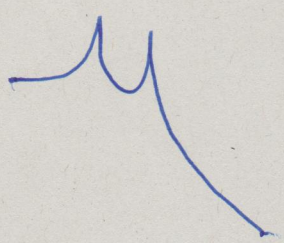
$$sC \cdot U_1 + \frac{U_1 - U_s}{R_0 + sL/2} + \frac{U_1 - U_2}{sL} = 0$$

$$\frac{U_2 - U_1}{sL} + \frac{U_2 - U}{sL/2} + sC\,U_2 = 0$$

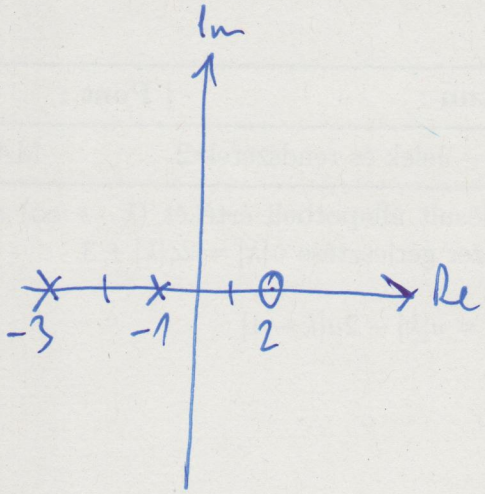
$$\frac{U}{R} + \frac{U - U_2}{sL/2} = 0$$

R, L, C, R_0

10, 1, 1, 0



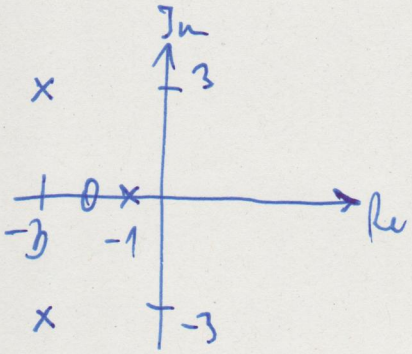
X.2



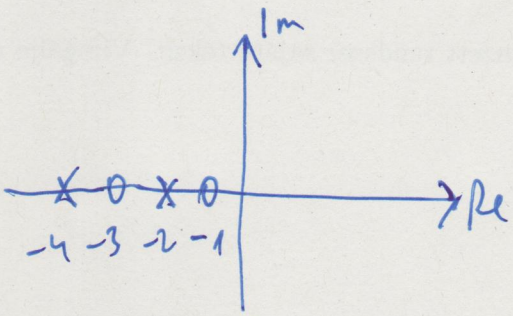
+ információ

$\lim_{t \to \infty} g(t) = 3$

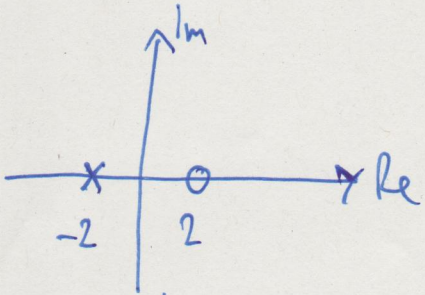
$H(s) = ?$

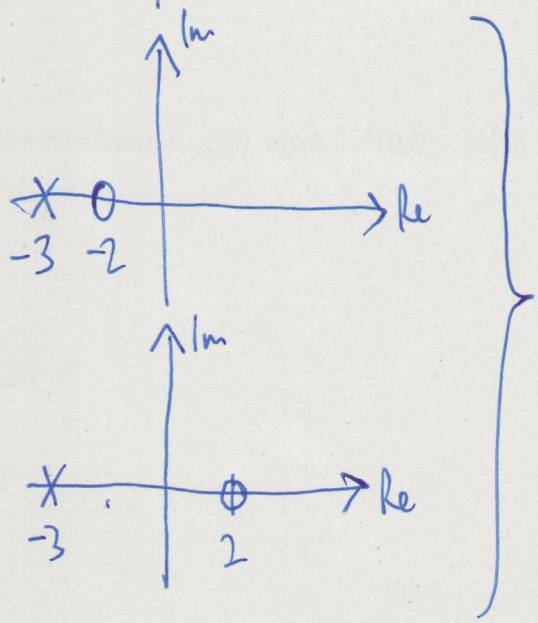


$\lim_{t \to 0+} g(t) = -2$



- Bode-diagram
- $H(j\omega) = \ldots$





Hasonlítsd össze az amplitúdó karakteristikákat!