## Exercise 1

For the circuit shown below find the currents $i_{\mathrm{L} 1}(t), i_{\mathrm{L} 2}(t)$ and the voltages $u_{\mathrm{C} 1}(t)$, $u_{\mathrm{C} 2}(t)$. Use a numerical solution to the differential equations, when $R_{0}=100 \mathrm{k} \Omega$, $R_{1}=300 \Omega, R_{2}=10 \mathrm{k} \Omega, L_{1}=0.01 \mathrm{mH}, L_{2}=10 \mathrm{mH}, C_{1}=10 \mu \mathrm{~F}, C_{2}=10 \mathrm{nF}$, and $U_{0}=10 \mathrm{kV}$. The switch has been opened for a long time. Use the function ode23t for faster calculation.


Circuit for Exercise 1

## Exercise 2

For the circuits shown below find the current $i_{\mathrm{L}}(t)$ and the voltage $u_{\mathrm{C}}(t)$. Use a numerical solution to the differential equations, when $R_{1}=10 \Omega, R_{2}=10 \Omega$, $L=10 \mathrm{mH}, C=100 \mu \mathrm{~F}$ and $U_{\mathrm{S}}=10 \mathrm{~V}$. The switch has been opened for a long time. Use time interval $0 \leq t \leq 10 \mathrm{~ms}$.


Circuits for Exercise 2
c)

Modify the script to solve the problem a) when DC source is replaced by harmonic source: $u_{\mathrm{s}}(t)=10 \sin (\omega t) \mathrm{V}, f=600 \mathrm{~Hz}$.
d)

Modify the script to solve the problem a) when DC source is replaced by pulse source: $\mathrm{u}_{\mathrm{s}}(t)=10 \mathrm{~V}$ at $0 \leq t \leq 5 \mathrm{~ms}, \mathrm{u}_{\mathrm{s}}(t)=0 \mathrm{~V}$ at $t>5 \mathrm{~ms}$ and $t<0 \mathrm{~ms}$.
e)

Calculate eigen-values of matrix A.

