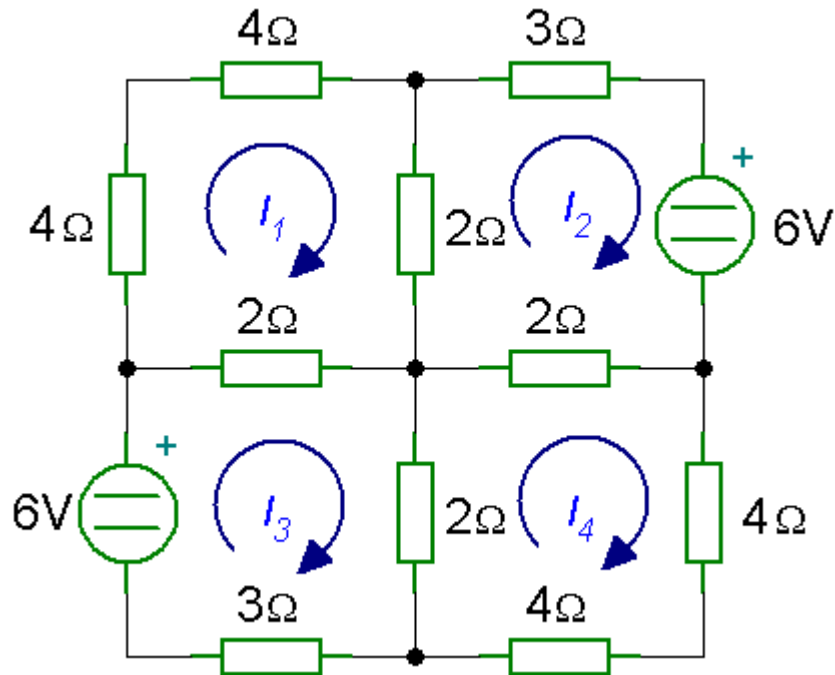


### Exercise 1

Using loop analysis and MATLAB find the loop currents  $I_1$ ,  $I_2$ ,  $I_3$  and  $I_4$ .



*Circuit for Exercise 1*

### Exercise 2

Given a signal

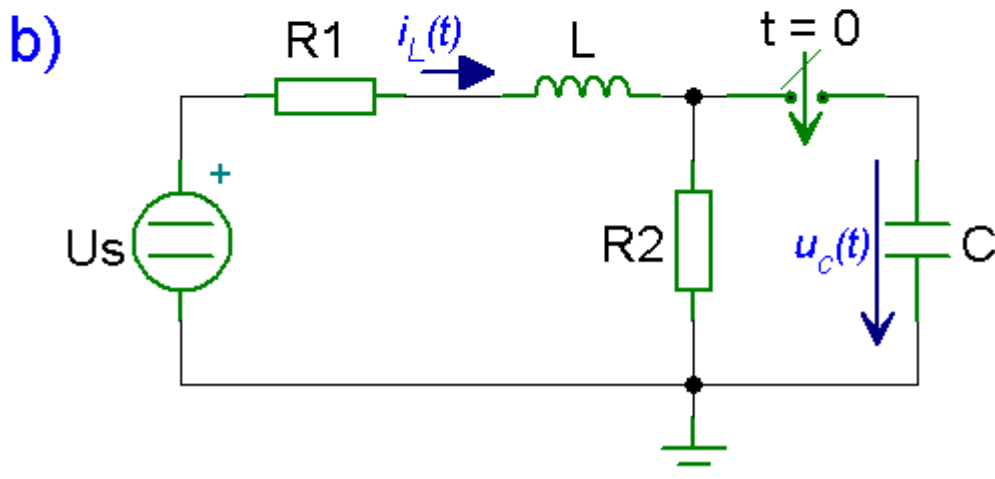
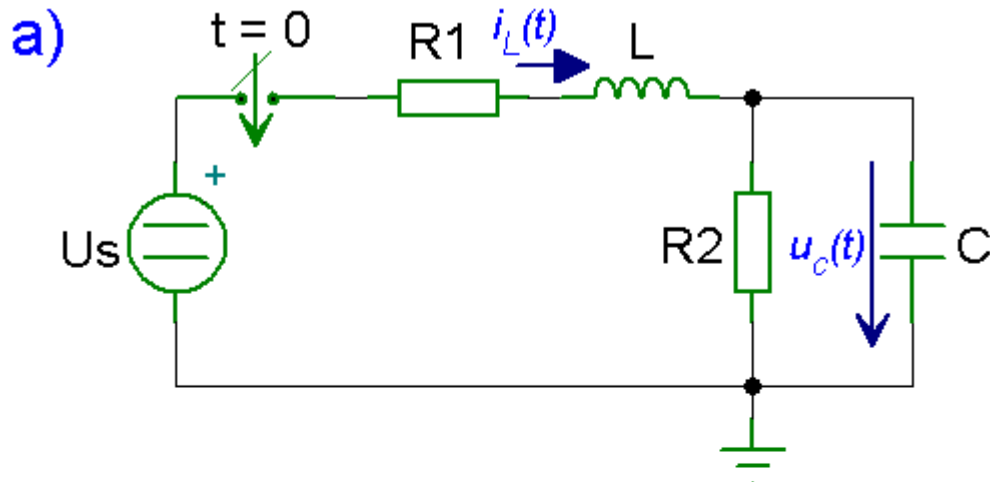
$$y(t) = 5 \sin(\omega t) + 7 \cos(2\omega t) + 7 \sin(2\omega t) + 6 \sin(3\omega t)$$

where  $\omega = 2\pi f$  and  $f = 50$  Hz;

Find the spectrum amplitudes of signal  $y(t)$ .

### Exercise 3

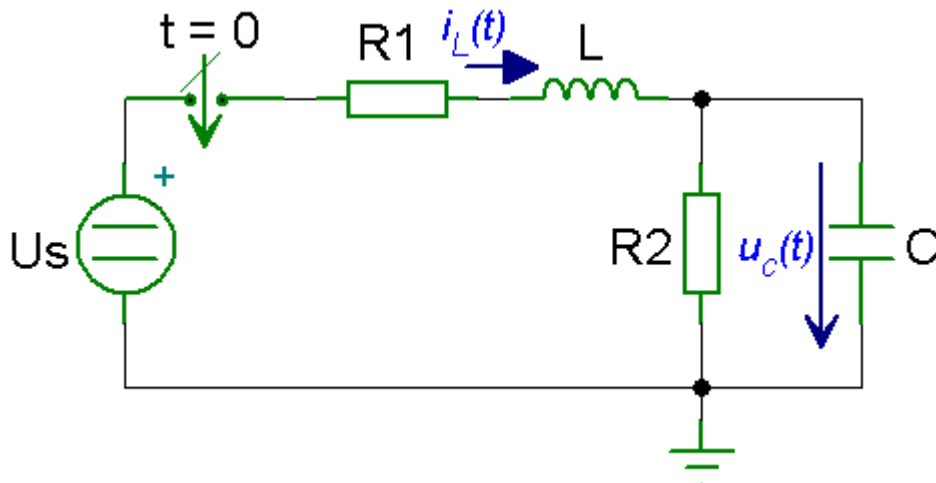
For the circuits shown below find the current  $i_L(t)$  and the voltage  $u_C(t)$ . Use a numerical solution to the differential equations, when  $R_1 = 10\ \Omega$ ,  $R_2 = 10\ \Omega$ ,  $L = 10\text{ mH}$ ,  $C = 100\ \mu\text{F}$  and  $U_S = 10\text{ V}$ . The switch has been opened for a long time.



*Circuits for Exercise 3*

#### Exercise 4

For the circuit shown below find the response for the voltage  $u_C(t)$ . Use generalized impedances  $Z(s)$ , if  $R_1 = 10\ \Omega$ ,  $R_2 = 10\ \Omega$ ,  $L = 10\ \text{mH}$ ,  $C = 100\ \mu\text{F}$  and  $U_S = 10\ \text{V}$ . The switch has been opened for a long time.



*Circuit for Exercise 4*