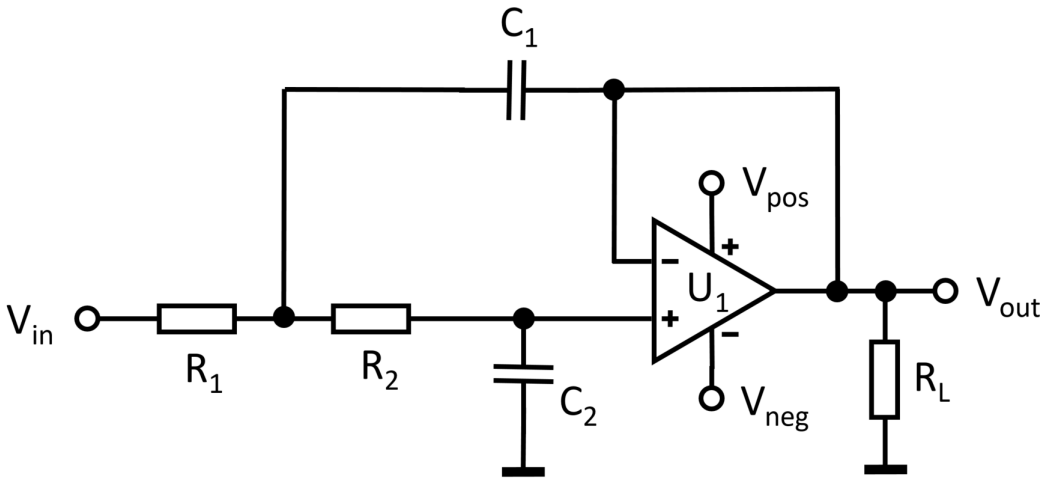
Exercise set

Exercise 1:

We want to analyze the following circuit using *LTspice*:



a) Draw the circuit and use the following values for the components:

R_1	$15\ k\Omega$
R_2	$15\ k\Omega$
R_L	$50\ \Omega$
C_1	$225\ pF$
C_2	$115\ pF$
$U1$	$UniversalOpamp2$
V_{pos}	$5\ V$
V_{neg}	$-5\ V$

b) Simulate the circuit and plot V_{out} as a function of time, when V_{in} is a sinusoidal signal with an amplitude of $1\ V$, a DC offset of $0\ V$ and frequency $f = 10\ kHz$.

c) Repeat the simulation for $f = 5\ kHz$, $f = 50\ kHz$, $f = 100\ kHz$ and $f = 500\ kHz$. What does the circuit do?

d) Find f_C for which the amplitude of V_{out} is $3\ dB$ lower than V_{in}.

e) Repeat d) for $C_2 = 65\ pF$, $C_2 = 200\ pF$ and $C_2 = 250\ pF$.

f) Find a value for C_2 such that $f_C = 30\ kHz$.

g) Simulate the circuit and plot V_{out} as a function of time, when V_{in} is a rectangular signal with an amplitude of $1\ V$, a DC offset of $0\ V$ and frequency $f = 20\ kHz$. What do you observe?

h) Plot the spectrum of V_{out}.