## Problem 3

An electronic frequency filter consists of four components coupled as in the
upper figure. The impedance of the source
can be neglected and the impedance of the
load can be taken as infinite. The filter
should be such that the voltage ratio
U_{out}/U_{in} has a frequency dependence shown
in the lower where U_{in} is the input voltage
and U_{out} is the output voltage. At frequency f_0 the phase lag between the two
voltages is zero.
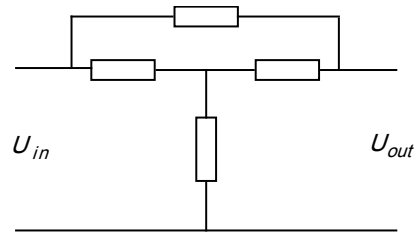
In order to build the filter you can choose from the following components:

2 resistors, 10 kΩ
2 capacitors, 10 nF
2 solenoids, 160 mH (iron-free and with neglible
resistance)
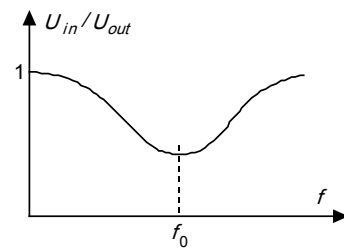
Construct, by combining four of these components,
a filter that fulfils the stated conditions. Determine
the frequency f_0 and the ratio U_{out}/U_{in} at this frequency for as many
component combinations as possible.