1. An RLC example

For the RLC filter above, with component values $R = 1\text{k}\Omega$, $C = 10\text{nF}$, and $L = 1\mu\text{H}$,

(a) Find the transfer function. The easiest way is probably to treat it as a voltage divider.

(b) Create a Bode plot of that transfer function. Please do it step by step and use the Bode plot table in the next page.

(c) (Optional) Connect a DC voltage $V_s$ source to $v_{in}$, derive the differential equations to describe the changes of $i_L$ and $v_C$.

$$\begin{align*}
\left(\frac{di_L}{dt}\right) &= A \left(\frac{i_L}{v_C}\right) + B \\
\left(\frac{dv_C}{dt}\right) &= A' \left(\frac{i_L}{v_C}\right) + B'
\end{align*}$$  \hspace{1cm} (1)