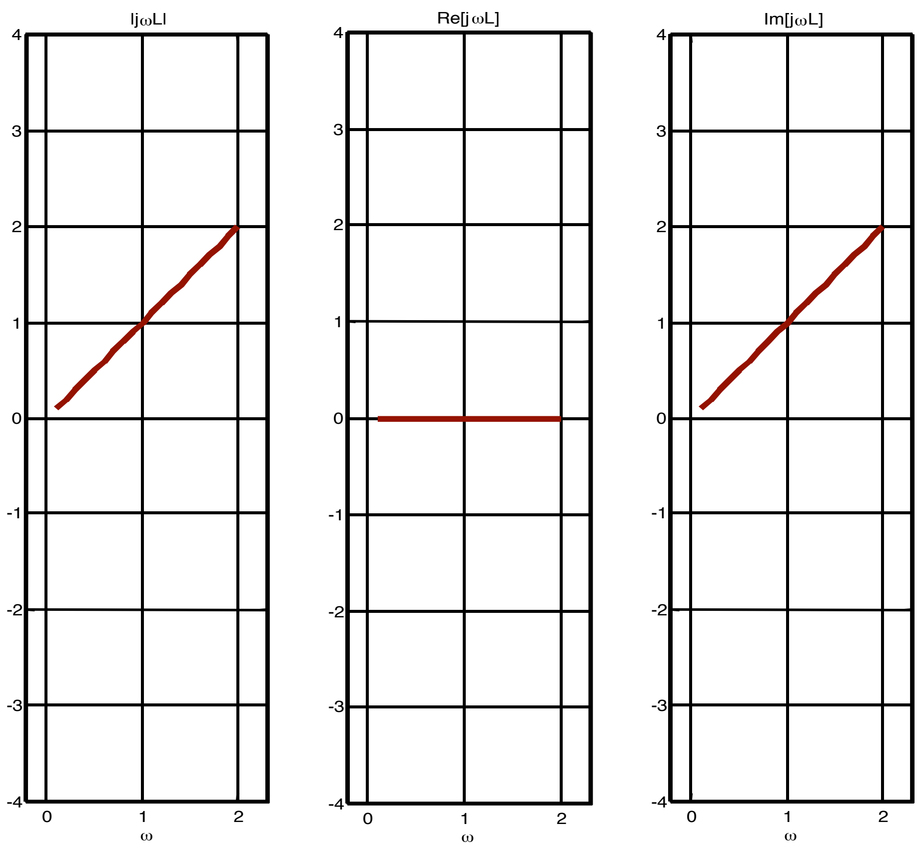
TOOL: By sketching the impedance or admittance curves of series and parallel combinations of R's, L's, and C's, we can find the approximate characteristics of passive filters. We sum impedance curves when components are in series. We sum admittance curves when components are in parallel.

The following are plots of impedance and admittance for various simple circuits. The plots are for $R = 1\Omega$, $L = 1H$, and $C = 1F$. Time constants are $L/R = 1$ s and $1/RC = 1$ s. Resonant frequency is $\omega_o \equiv 1/\sqrt{(LC)} = 1$ s. The plot labels indicate how to factor out R and adjust the plots in terms of time constants.

Z_L

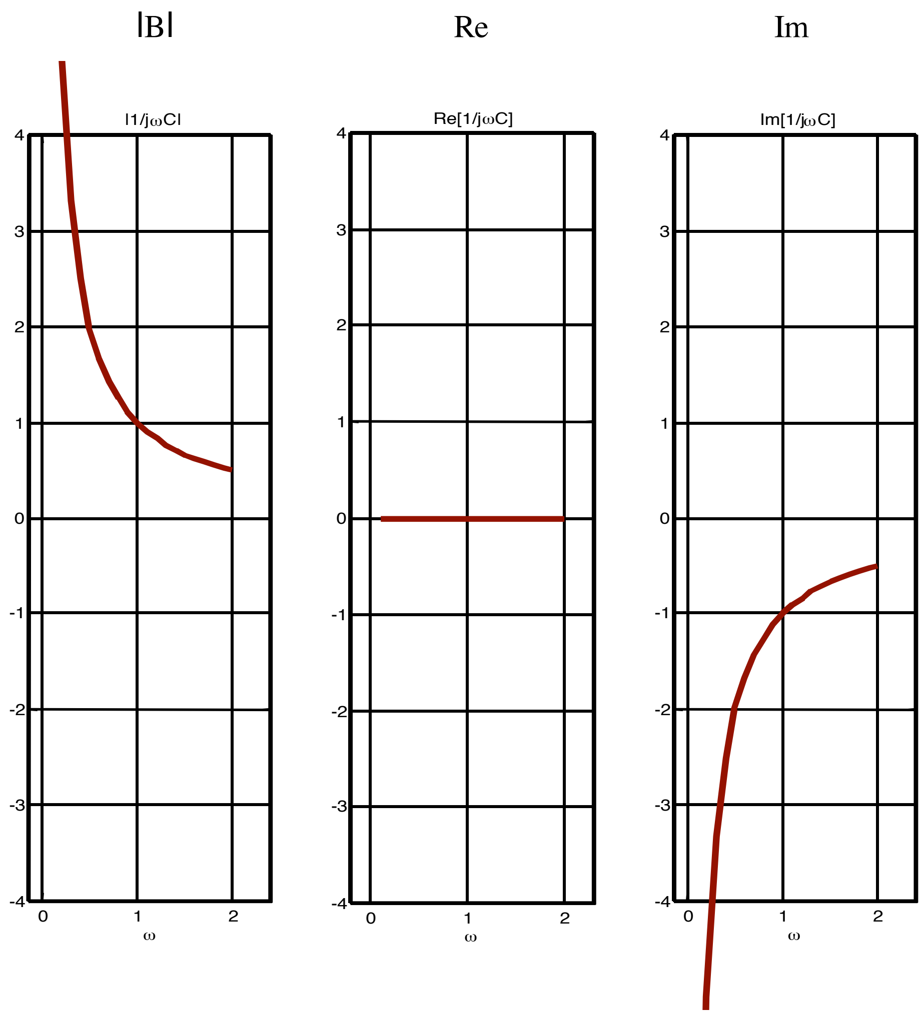
Scale vertical by value of L.

|Z| Re Im



Z_C

Scale vertical by value of 1/C.

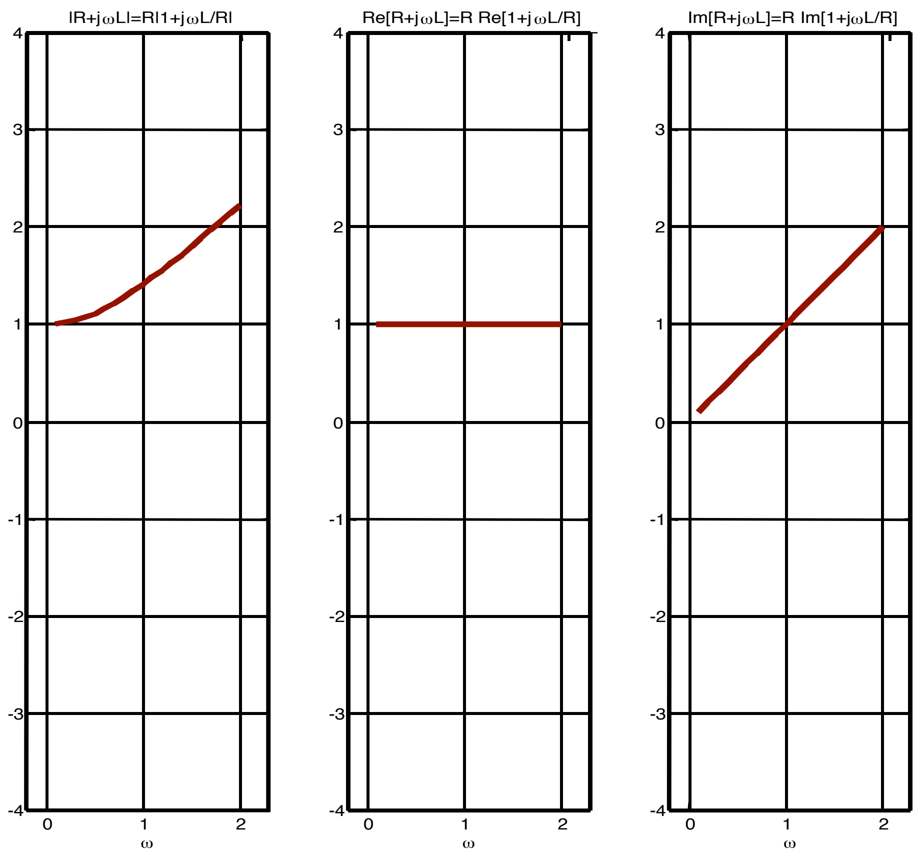


$Z_{L+j\omega L}$

Scale vertical by value of R.

Scale horizontal by value of R/L.

|B| Re Im

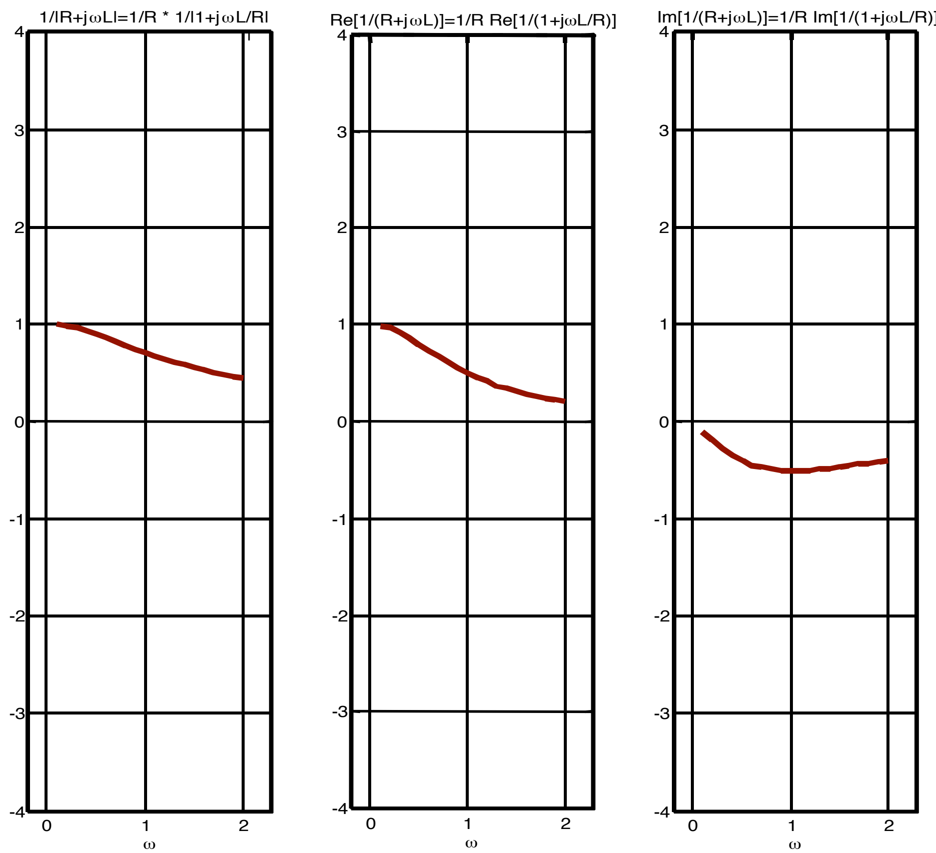


$B_{R+j\omega L} = 1/Z$

Scale vertical by value of 1/R.

Scale horizontal by value of R/L.

|B| Re Im

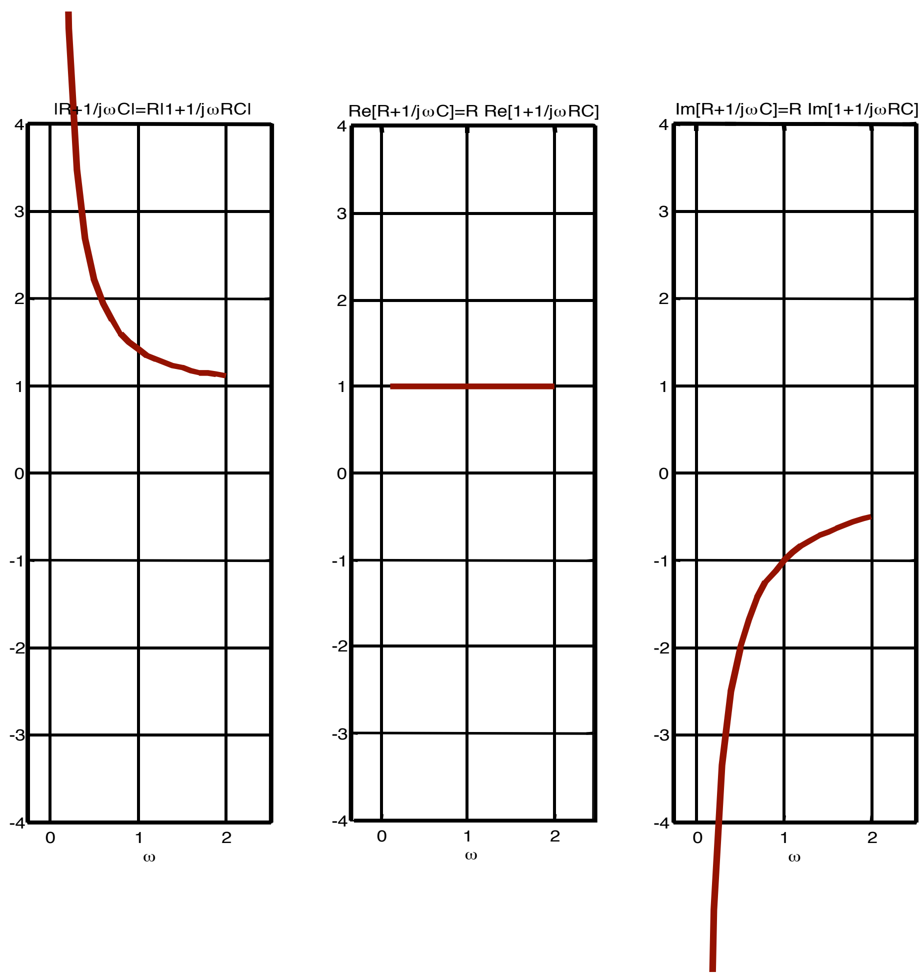


$Z_{R+1/j\omega C}$

Scale vertical by value of R.

Scale horizontal by value of 1/RC.

|B| Re Im



$B_{R+1/j\omega C} = 1/Z$

Scale vertical by value of 1/R.

Scale horizontal by value of 1/RC.

|B| Re Im