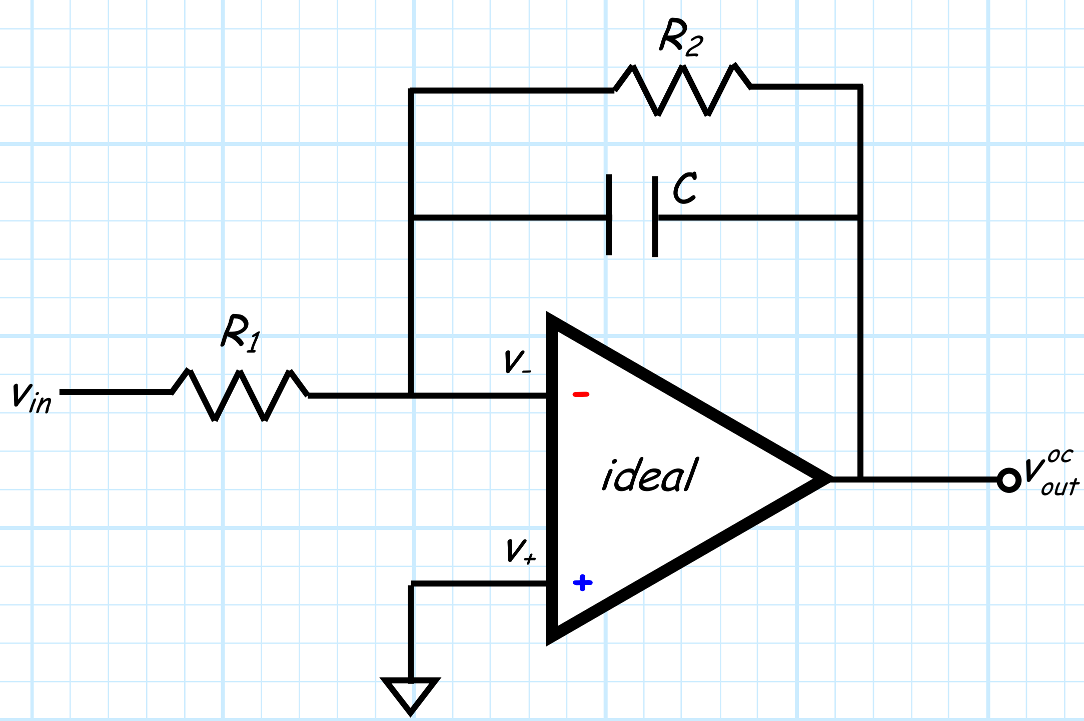
Example: An Inverting Network

Now let's determine the complex **transfer function** of this circuit:



It's the inverting configuration!

Note this circuit uses the **inverting** configuration, so that:

$$G(\omega) = -\frac{Z_2(\omega)}{Z_1(\omega)}$$

where $Z_1 = R_1$, and:

$$Z_2 = R_2 \left\| \, {}^{1}\!\big/_{j\omega C} \right. = \frac{R_2}{1 + j\omega R_2 C}$$

Therefore, the **transfer function** of this circuit is:

$$G(\omega) = \frac{v_{out}^{oc}(\omega)}{v_{in}(\omega)} = -\frac{R_2}{R_1} \frac{1}{1 + j\omega R_2 C}$$

Another low-pass filter

Thus, the transfer function **magnitude** is:

$$\left|G(\omega)\right|^2 = \left(-\frac{R_2}{R_1}\right)^2 \frac{1}{1+\left(\omega / \omega_0\right)^2}$$

where:

$$\omega_0 = \frac{1}{R_2 C}$$

Thus, just as with the previous example, this circuit is a **low-pass filter**, with **cutoff** frequency ω_0 and pass-band **gain** $\left(R_2/R_1\right)^2$.