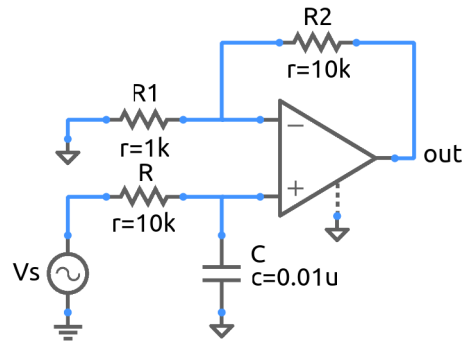


## ee101\_op\_filter\_1a.sqproj



The first-order low-pass active filter shown in the figure has a transfer function given by (show this):

$$H(j\omega) = \left(1 + \frac{R_2}{R_1}\right) \frac{1}{1 + j\omega/\omega_0}. \quad (1)$$

The low-frequency gain of the filter is controlled by the ratio  $R_2/R_1$  whereas the cut-off frequency  $f_0 = \frac{1}{2\pi} \frac{1}{RC}$ .

### Exercise Set

1. For the component values shown in the figure, what is the low-frequency gain? What is the cut-off frequency  $f_0$ ?
2. What will happen to the magnitude frequency response of the filter if  $R_2$  is changed to  $20 \text{ k}\Omega$ ?
3. What will happen to the magnitude frequency response of the filter if  $C$  is changed to  $100 \text{ nF}$ ?

For each question, check your answers with simulation.