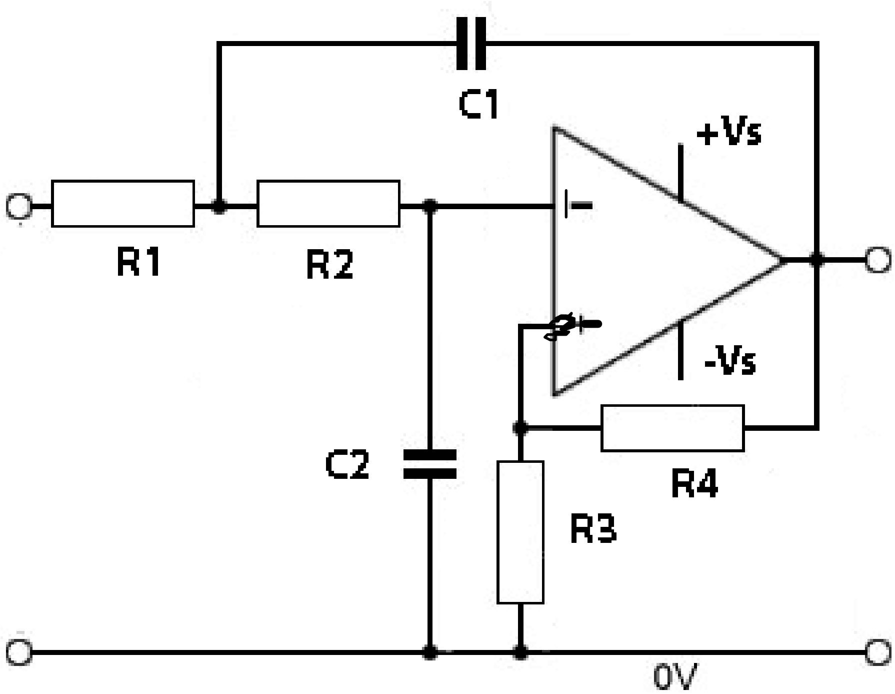
Anden ordens butterworth



ingen forstærkning og ser bort fra R4 og R3

$s^2 + 1.414\, s + 1$

$\zeta = \dfrac{1.414}{2} \xrightarrow{\text{at 5 digits}} \zeta = 0.70700$

Vi bruger anden metode, til at bestemme R og C_1 og C_2. Bestemmer at R=100kΩ, for at minimere spæningdelingen mellem kredsløbet og spæningskilden.

Den ønskede knæk frekvens $f_c := 11$ og efter som $f_c = \dfrac{\omega_c}{2\,\pi}$ så er $\omega_c = f_c \cdot 2 \cdot \pi \xrightarrow{\text{solve for omega[c]}}$

$[[\omega_c = 22\,\pi]]$

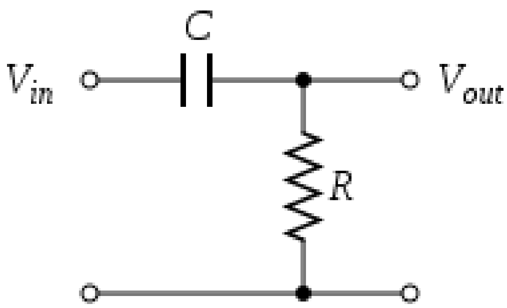
Løser de to ligniger, med de to ubekendte. $R\sqrt{C_1 C_2} = \dfrac{1}{\omega_0}, \dfrac{C_2}{C_1} = \zeta^2$

$100000\sqrt{C_1 C_2} = \dfrac{1}{22\,\pi}, \dfrac{C_2}{C_1} = 0.707^2 \xrightarrow{\text{solve}}$

$\{C_1 = 2.046482488\ 10^{-7}, C_2 = 1.022932225\ 10^{-7}\}, \{C_1 = -2.046482488\ 10^{-7}, C_2 = -1.022932225\ 10^{-7}\}$

1. test på andere komponenter

High pass

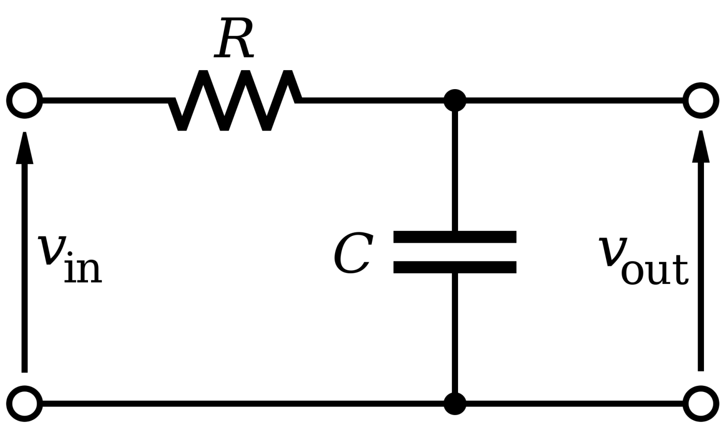


$f_c := 0.3:$
$R := 1000000:$

$$f_c = \frac{1}{2\,\pi \cdot R \cdot C} \xrightarrow{\text{isolate for C}} C = 5.305164770\ 10^{-7} \xrightarrow{\text{at 5 digits}} C = 5.3052\ 10^{-7}$$

$$\frac{1}{2\,\pi \cdot R \cdot 680 \cdot 10^{-9}} \xrightarrow{\text{at 5 digits}} 0.23405$$

Low pass

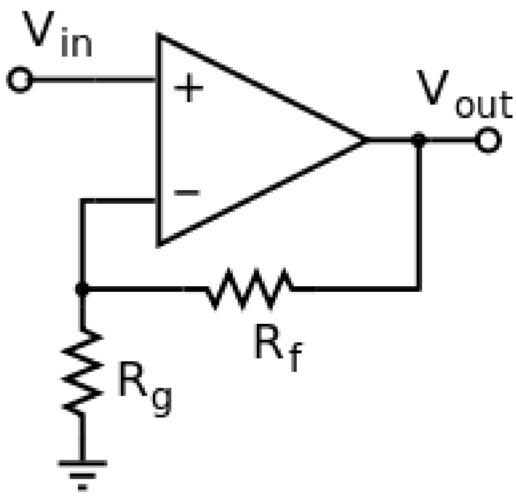


$f_c := 0.3:$
$R := 1000000:$

$$f_c = \frac{1}{2\,\pi \cdot R \cdot C}$$

$$\frac{1}{2\,\pi \cdot R \cdot 680 \cdot 10^{-9}} \xrightarrow{\text{at 5 digits}} 0.23405$$

Gain oscillationer

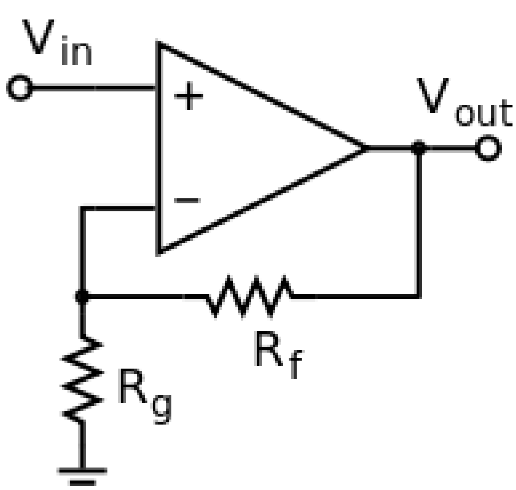


$$A = \frac{V_o}{V_i} = 1 + \frac{R_f}{R_g}$$

$$100 = 1 + \frac{100000}{R_g} \xrightarrow{\text{isolate for R\_\_g}} R_g = \frac{100000}{99} \xrightarrow{\text{at 5 digits}} R_g = 1010.1$$

$$gain = 1 + \frac{100000}{1000} \xrightarrow{\text{at 5 digits}} gain = 101.$$

Gain DC



$$A = \frac{V_o}{V_i} = 1 + \frac{R_f}{R_g}$$

$$2 = 1 + \frac{100000}{R_g} \xrightarrow{\text{isolate for R\_\_g}} R_g = 100000 \xrightarrow{\text{at 5 digits}} R_g = 1.0000\ 10^5$$

$$gain = 1 + \frac{100000}{100000} \xrightarrow{\text{at 5 digits}} gain = 2.$$