(1) a) $R = \dfrac{1}{\omega_o C} = \dfrac{1}{2\pi \times 10^4 \times 10^{-8}} \simeq 1.6 \, k\Omega$

$R_f = R_1 = 2 \, k\Omega$

$R_3 = R_2 (2Q-1) = 9 \, k\Omega$

b) Transfer function:

$$T(s) = \dfrac{s[2R_3/(R_2+R_3)]\omega_o}{s^2 + s[2R_2/(R_2+R_3)]\omega_o + \omega_o^2}$$

$$= \dfrac{a_1 s}{s^2 + s\dfrac{\omega_o}{Q} + \omega_o^2} = \dfrac{1.13 \times 10^5 s}{s^2 + 1.25 \times 10^4 s + 3.95 \times 10^9}$$

c)

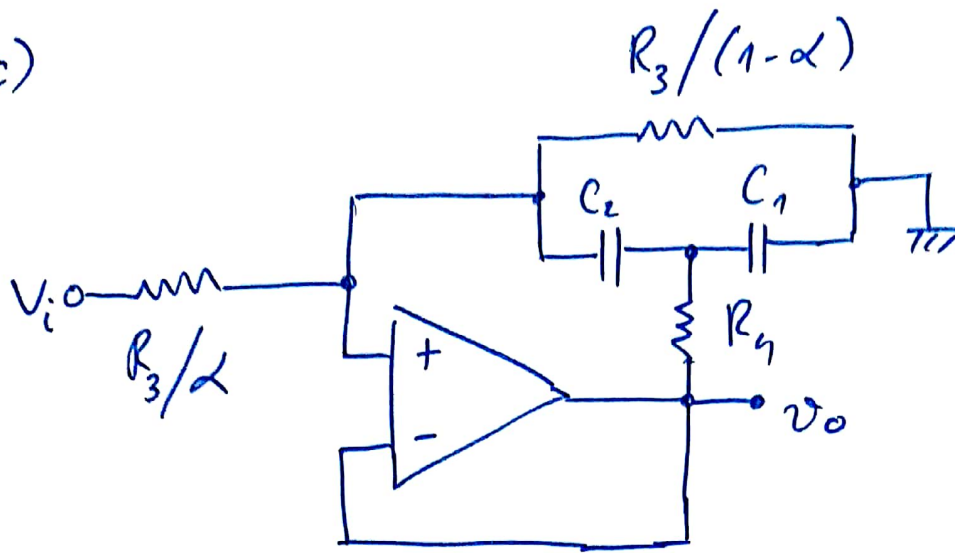$\omega_{L,H} = \omega_o \sqrt{1 + \dfrac{1}{4Q^2}} \mp \dfrac{\omega_o}{2Q}$
$\begin{cases} 5.68 \times 10^4 \, rad/s \\ 6.94 \times 10^4 \, rad/s \end{cases}$

(2) a) $\omega_o^2 = \dfrac{1}{C_1 C_2 R_3 R_4}$ $(\Leftrightarrow)$ $C_2 = \dfrac{1}{C_1 R_3 R_4 \omega_o^2} \simeq 2.89 \, nF$

b) $BW = \dfrac{\omega_o}{Q} = \left(\dfrac{1}{C_1} + \dfrac{1}{C_2}\right)\dfrac{1}{R_3} \simeq 4 \times 10^4 \, rad/s$

$\Rightarrow Q = \dfrac{\omega_o}{BW} \simeq 1.57$

c)

Inject to a component connected to gnd node.