1.)

$$\frac{V_o(s)}{V_i(s)} = \frac{\frac{1}{Cs}}{R+\frac{1}{Cs}} = \frac{1}{RCs+1}$$

$$\frac{V_o(s)}{V_i(s)} = \frac{R}{R+\frac{1}{Cs}} = \frac{RCs}{RCs+1}$$

2) a) $\frac{V_o(s)}{V_i(s)} = \frac{1}{RCs+1} = \frac{1}{3.96\times10^{-6}s+1}$

$$= \frac{252520}{s+252520}$$

$$\left|\frac{V_o}{V_i}\right| = \frac{1}{\sqrt{2}} = \frac{252520}{\sqrt{\omega_c^2+(252520)^2}}$$

$$\omega_c = 252520 \text{ rad/s}$$

b) $$\frac{1}{RCs+1} = \frac{1}{1.6\times10^{-6}s+1}$$

$$= \frac{617283}{s+617283}$$

$$\left|\frac{V_o}{V_i}\right| = \frac{1}{\sqrt{2}} = \frac{617283}{\sqrt{\omega_c^2+617283^2}}$$

$$\omega_c = 617283 \text{ rad/s}$$

low pass filter

3) a) $\frac{V_o}{V_i} = \frac{RCs}{RCs+1} = \frac{15.9 \times 10^{-6} s}{15.9 \times 10^{-6} s + 1}$

$= \frac{s}{s + 62893}$

$\left|\frac{V_o}{V_i}\right| = \frac{1}{\sqrt{2}} = \frac{\omega_c}{\sqrt{\omega_c^2 + 62893^2}}$

$\omega_c = 62893 \text{ rad/s}$

High pass filter.