

(b)
$$I_o = \frac{75/s}{\frac{3200}{s} + 100 + 0.5s} = \frac{75}{0.5s^2 + 100s + 3200}$$

$$= \frac{150}{s^2 + 200s + 6400} = \frac{150}{(s+40)(s+160)} = \frac{A}{s+40} + \frac{B}{s+160}$$

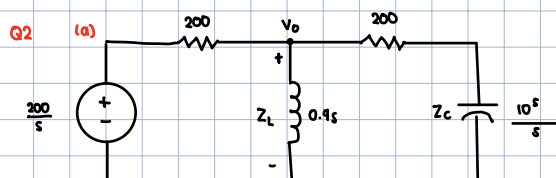
$$150 = A(s+160) + B(s+40)$$

@ $s = -40$: $150 = A(120) \rightarrow A = 1.25$

@ $s = -160$: $150 = B(-120) \rightarrow B = -1.25$

$$I_o = \frac{1.25}{s+40} - \frac{1.25}{s+160}$$

(c)
$$i_o(t) = (1.25e^{-40t} - 1.25e^{-160t})u(t) \text{ A}$$



$$Z_C = 1/sC = 1/s(10 \times 10^{-6}) = 10^5/s$$

$$Z_L = sL = s(400 \times 10^{-3}) = 400 \times 10^{-3}s$$

(b) NODE V_o :
$$\frac{V_o - 200/s}{200} + \frac{V_o}{0.4s} + \frac{V_o}{200 + 10^5/s} = 0$$

$$V_o \left[\frac{1}{200} + \frac{1}{0.4s} + \frac{s}{200s + 10^5} \right] = \frac{1}{s}$$

$$V_o \left[1 + \frac{500}{s} + \frac{s}{s + 500} \right] = \frac{200}{s}$$

$$V_o \left[\frac{s(s+500) + 500(s+500) + s^2}{s(s+500)} \right] = \frac{200}{s}$$

$$V_o \left[\frac{2s^2 + 1000s + 250000}{s(s+500)} \right] = \frac{200}{s}$$

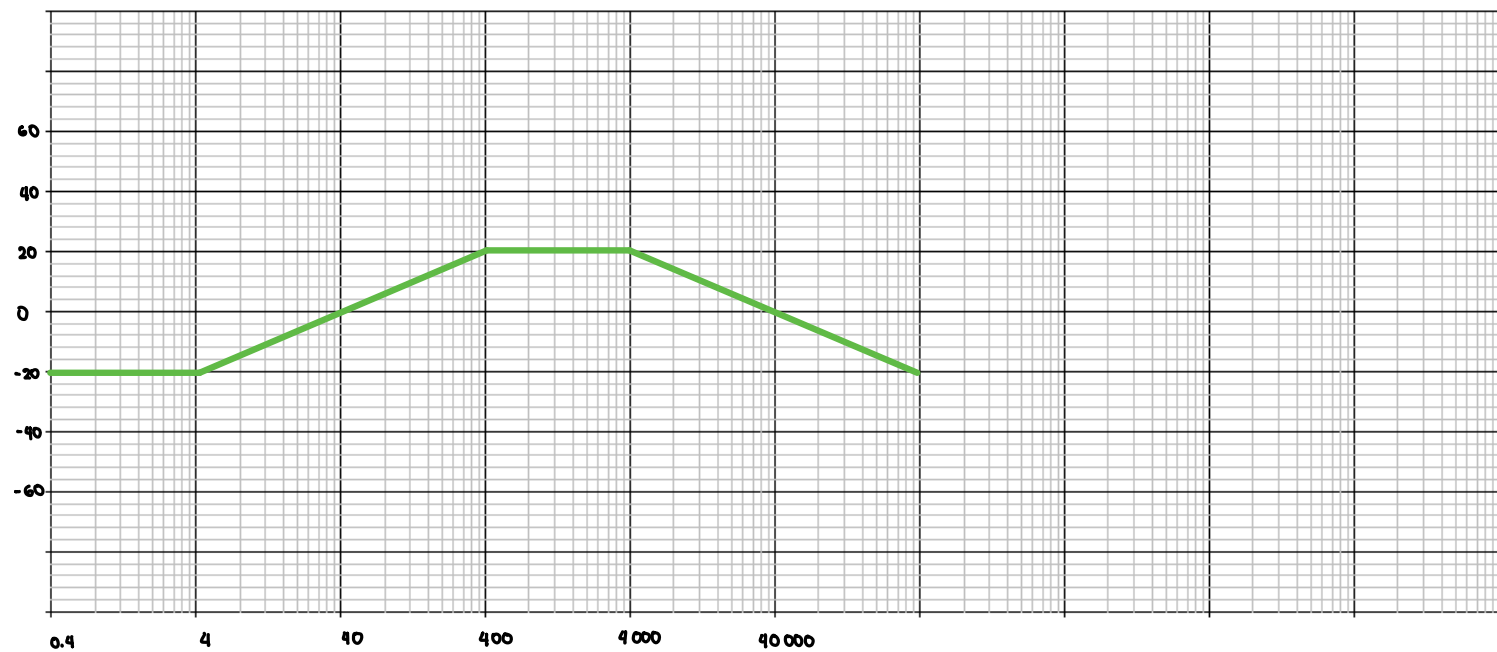
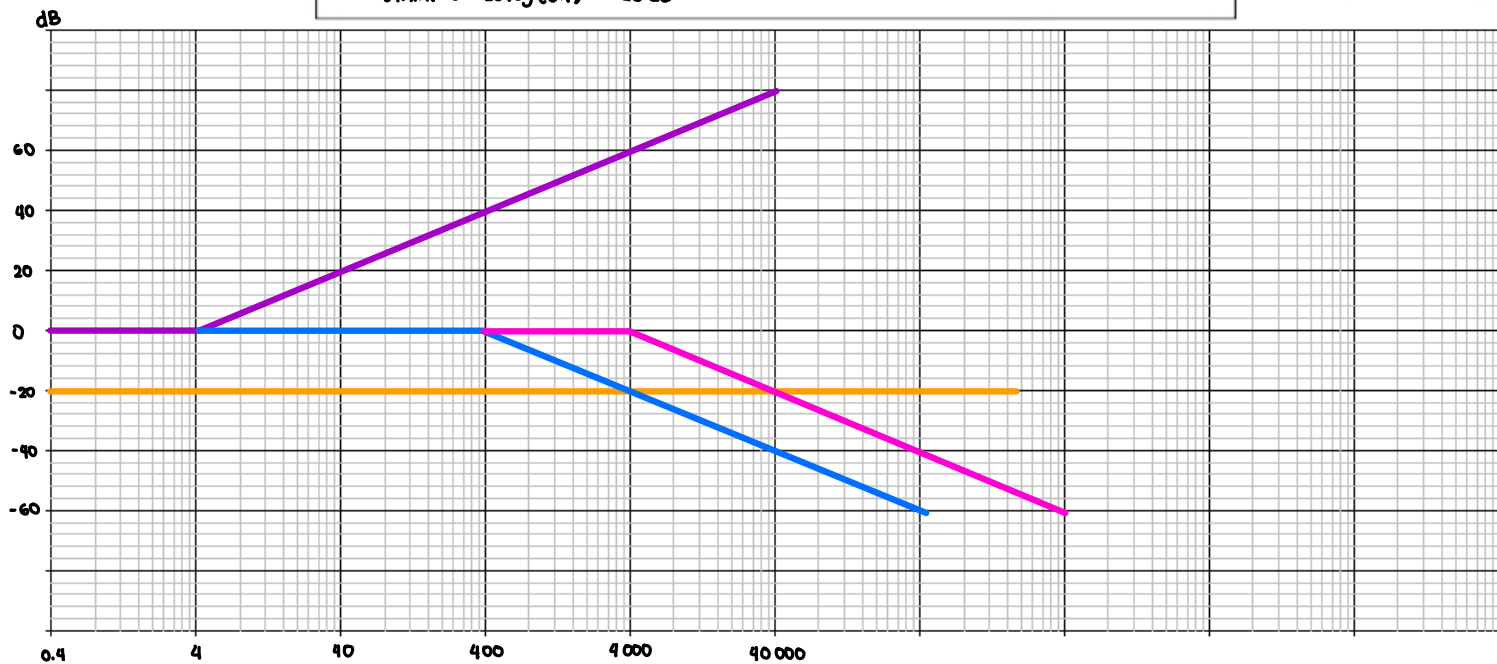
$$V_o = \frac{200(s+500)}{2(s^2 + 500s + 125 \times 10^3)} = \frac{100(s+500)}{s^2 + 500s + 125 \times 10^3}$$

Q3 (a)

$$H(s) = \frac{40000 \cdot 4 (1 + s/4)}{400(1 + s/400) \cdot 4000(s + 1/4000)} = \frac{0.1(1 + s/4)}{(1 + s/400)(s + 1/4000)}$$

STARTING: $20 \log(0.1) = -20 \text{ dB}$

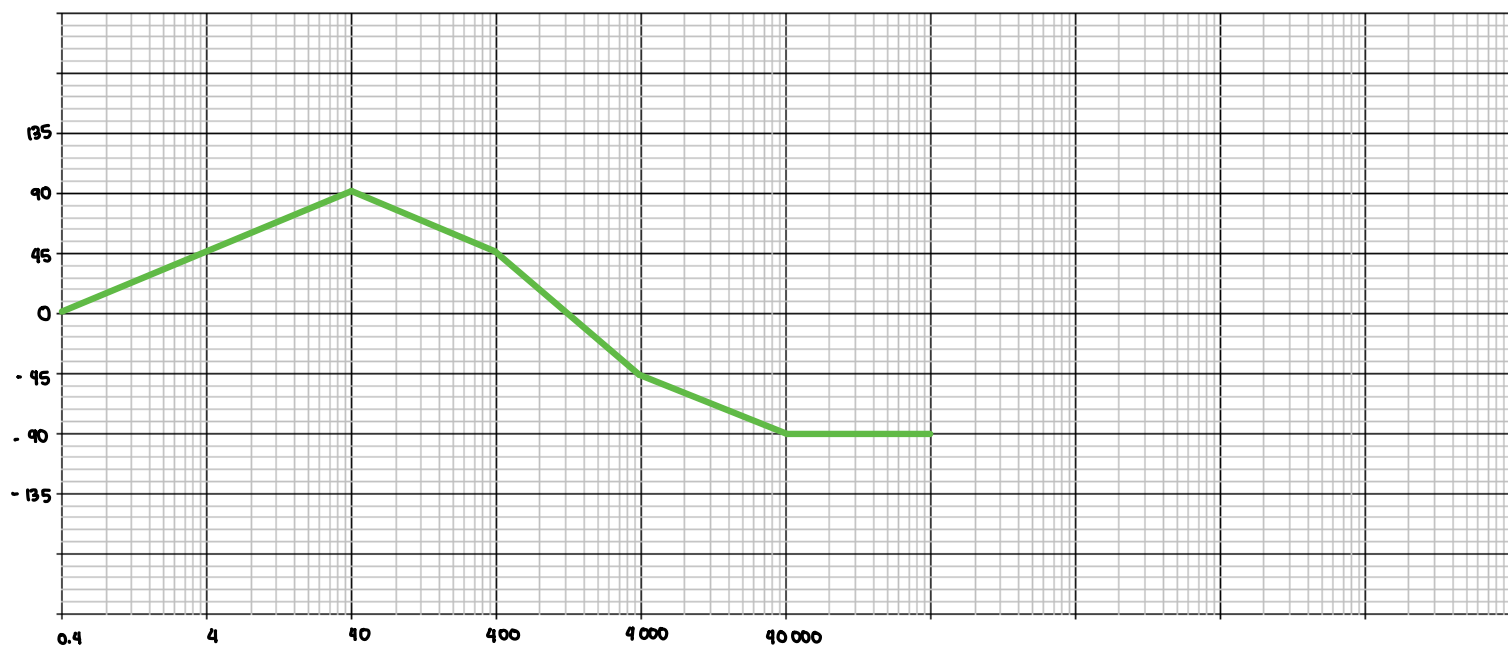
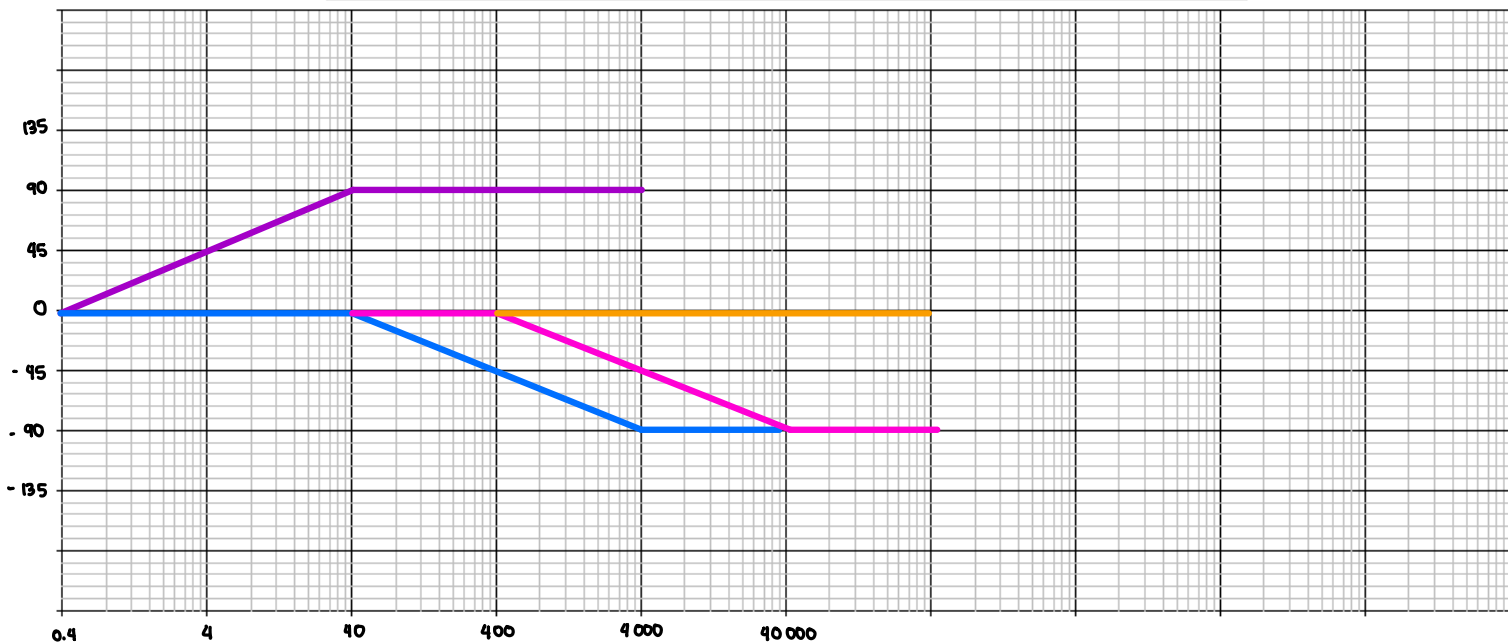
MAGNITUDE



Q3 (a)

$$H(s) = \frac{40000 \cdot 4 (1 + s/4)}{400(1 + s/400) \cdot 4000(s + 1/4000)} = \frac{0.1(1 + s/4)}{(1 + s/400)(s + 1/4000)}$$

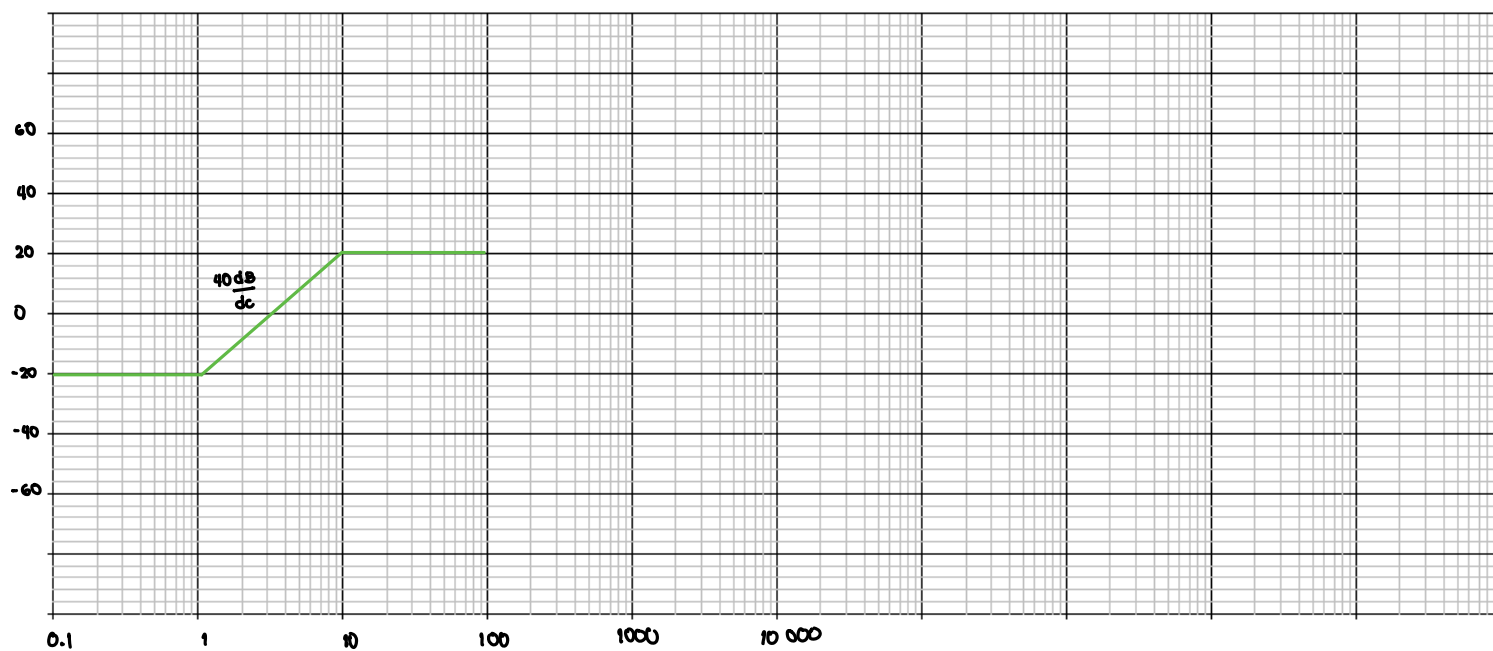
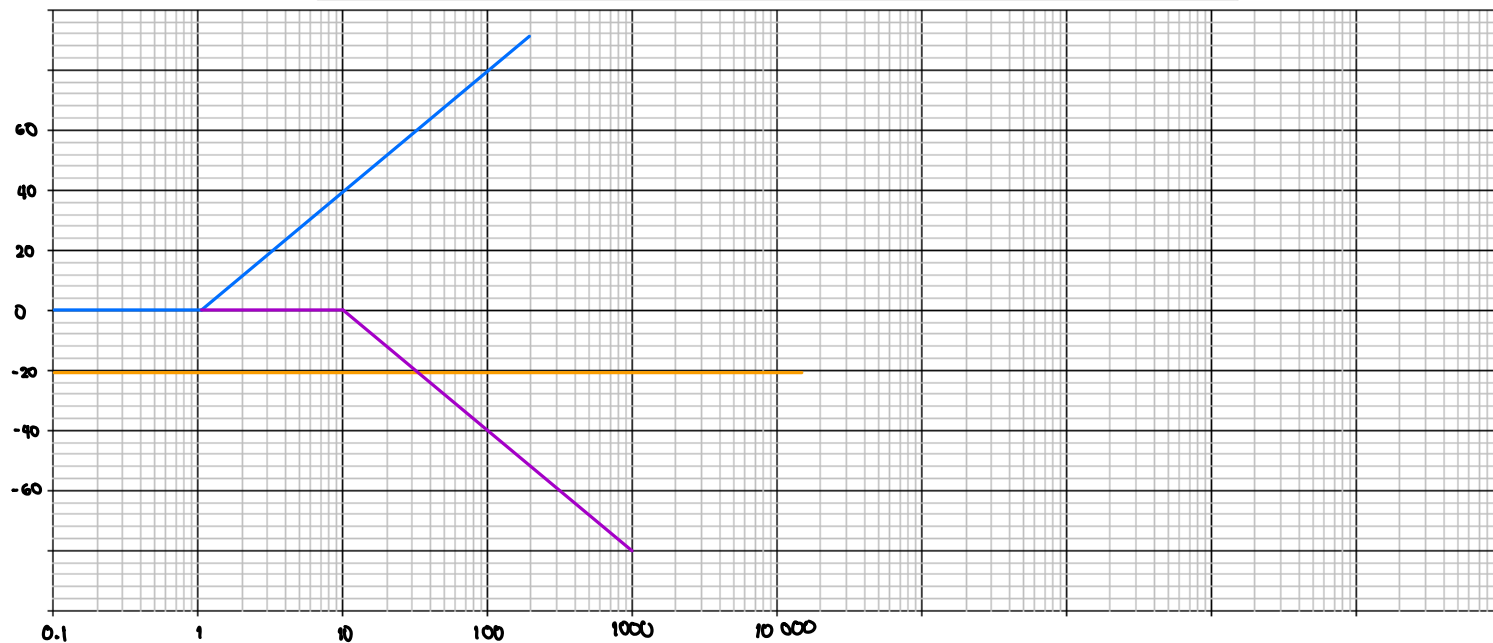
PHASE ANGLE



Q3 (b)

$$H(s) = \frac{10(s+1)^2}{100(s^2/100 + s/100 + 1)} = \frac{0.1(1+s)^2}{(1 + s/100 + s^2/100)}$$

MAGNITUDE



Q3 (b)

$$H(s) = \frac{10(s+1)^2}{100(s^2/100 + s/100 + 1)} = \frac{0.1(1+s)^2}{(1 + s/100 + s^2/100)}$$

PHASE ANGLE

