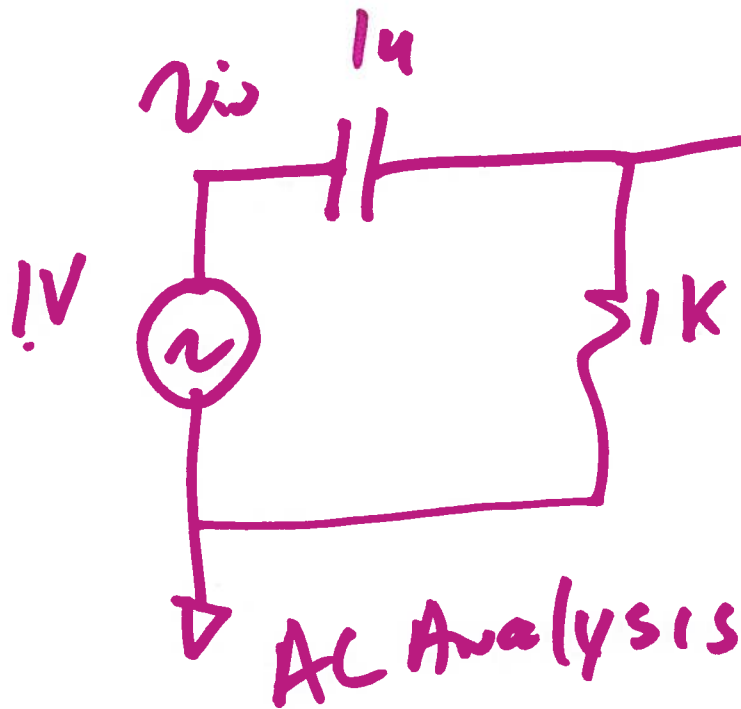
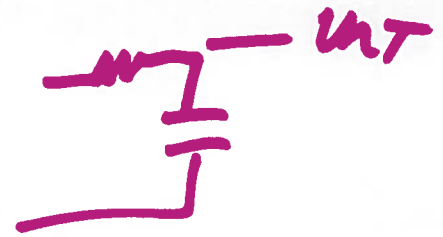


# EE 420L LAB 1



$$v_{out} = v_{in} \cdot \frac{1K}{1K + \frac{1}{j\omega 1\mu F}}$$

$$\frac{v_{out}}{v_{in}} = \frac{0 + j\omega 10^{-3}}{1 + j\omega 10^{-3}}$$

$$\left| \frac{v_{out}}{v_{in}} \right| = \frac{\sqrt{0^2 + (2\pi f \cdot 10^{-3})^2}}{\sqrt{1 + (2\pi f \cdot 10^{-3})^2}}$$

1)

$$a \cdot b = \frac{a}{\frac{1}{b}} \quad 2\pi f \cdot 10^{-3} = \frac{f}{\frac{1}{2\pi \cdot 10^3}} = \frac{f}{159}$$

$$f_{*} = \frac{1}{2\pi \cdot 10^{-3}} = 159 \text{ Hz}$$

$$\frac{v_{\text{out}}}{v_{\text{in}}} = \frac{0 + j \frac{f}{159}}{1 + j \frac{f}{159}} \quad f_z = 0$$

$$f_p = 159$$

$$\left| \frac{v_{\text{out}}}{v_{\text{in}}} \right| = \frac{\sqrt{0^2 + \left(\frac{f}{159}\right)^2}}{\sqrt{1^2 + \left(\frac{f}{159}\right)^2}} = \frac{f}{159 \sqrt{1 + \left(\frac{f}{159}\right)^2}}$$

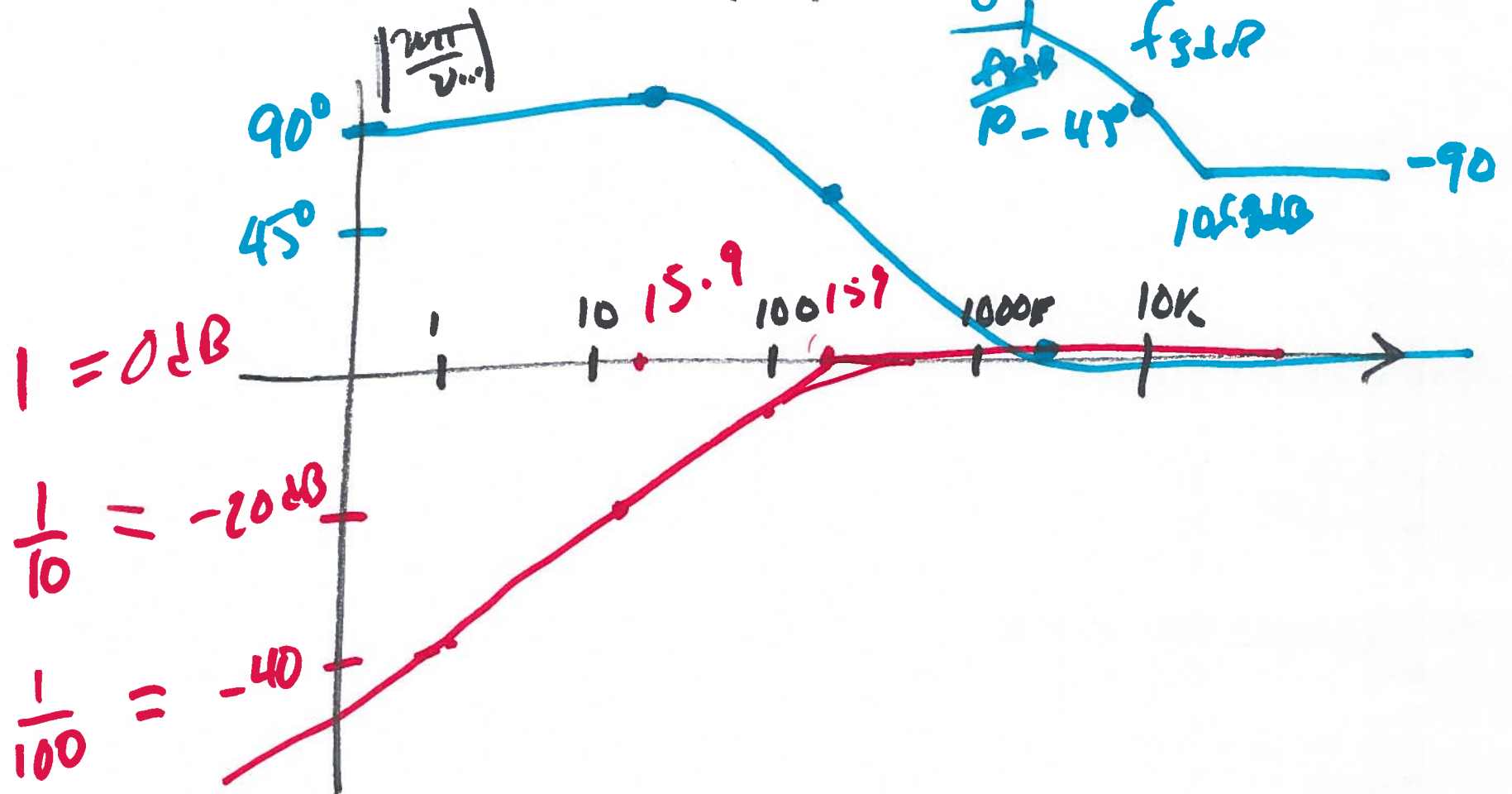
$$\angle \frac{v_{\text{out}}}{v_{\text{in}}} = +\tan^{-1} \frac{f}{159} - \tan^{-1} \frac{f}{159} = 90 - \tan^{-1} \frac{f}{159}$$

$$\frac{v_{out}}{v_{in}} = \frac{j \cdot \frac{f}{159}}{1 + j \frac{f}{159}}$$

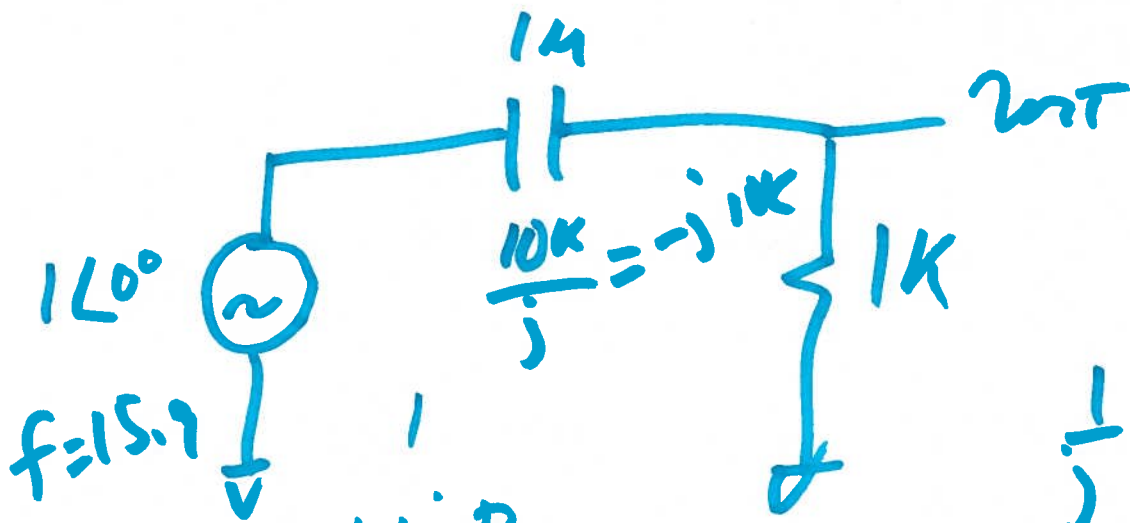
$$20 \log 0.1$$

$$20 \log 10^{-1}$$

$$-20 \text{ dB}$$



3)



$$Z_C = -j \frac{1}{2\pi \cdot 15.9 \cdot 10^{-6}}$$

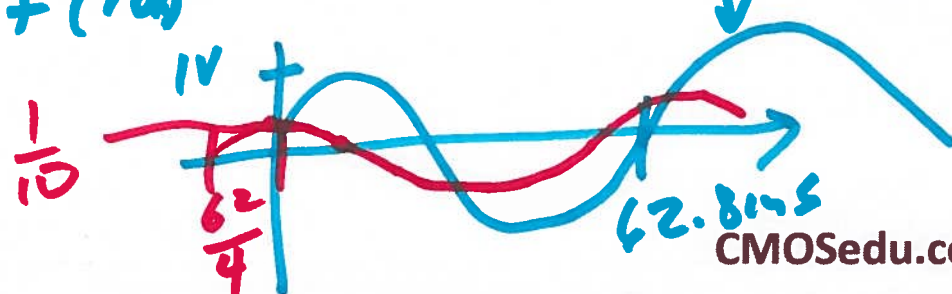
$$\frac{1}{j} = -j = \frac{159}{15.9 \cdot 10^{-3}}$$

$$10^4 \parallel \frac{1}{2\pi \cdot 10^{-3}} = 159$$

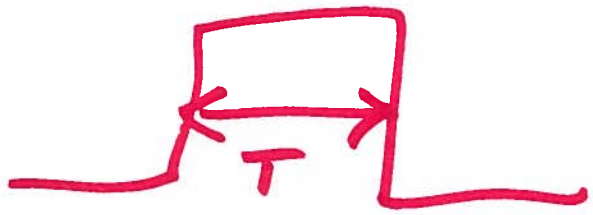
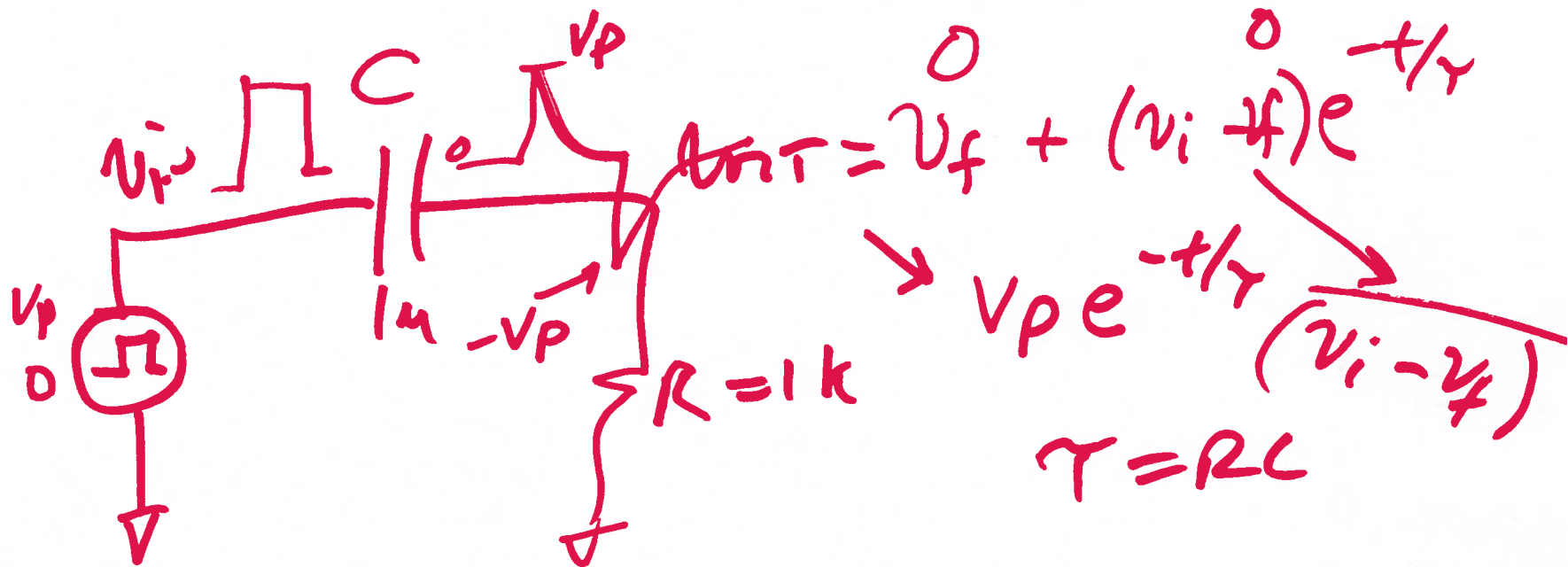
$$2V_{AT} = 1\angle 0 \cdot \frac{1K}{1K + (-j10K)}$$

$$\rightarrow 0 + \tan^{-1} \frac{10K}{1K}$$

$$= \frac{1K}{\sqrt{(1K)^2 + (10K)^2}} = \frac{1}{10} = \tan^{-1} 10 = 84.3^\circ$$



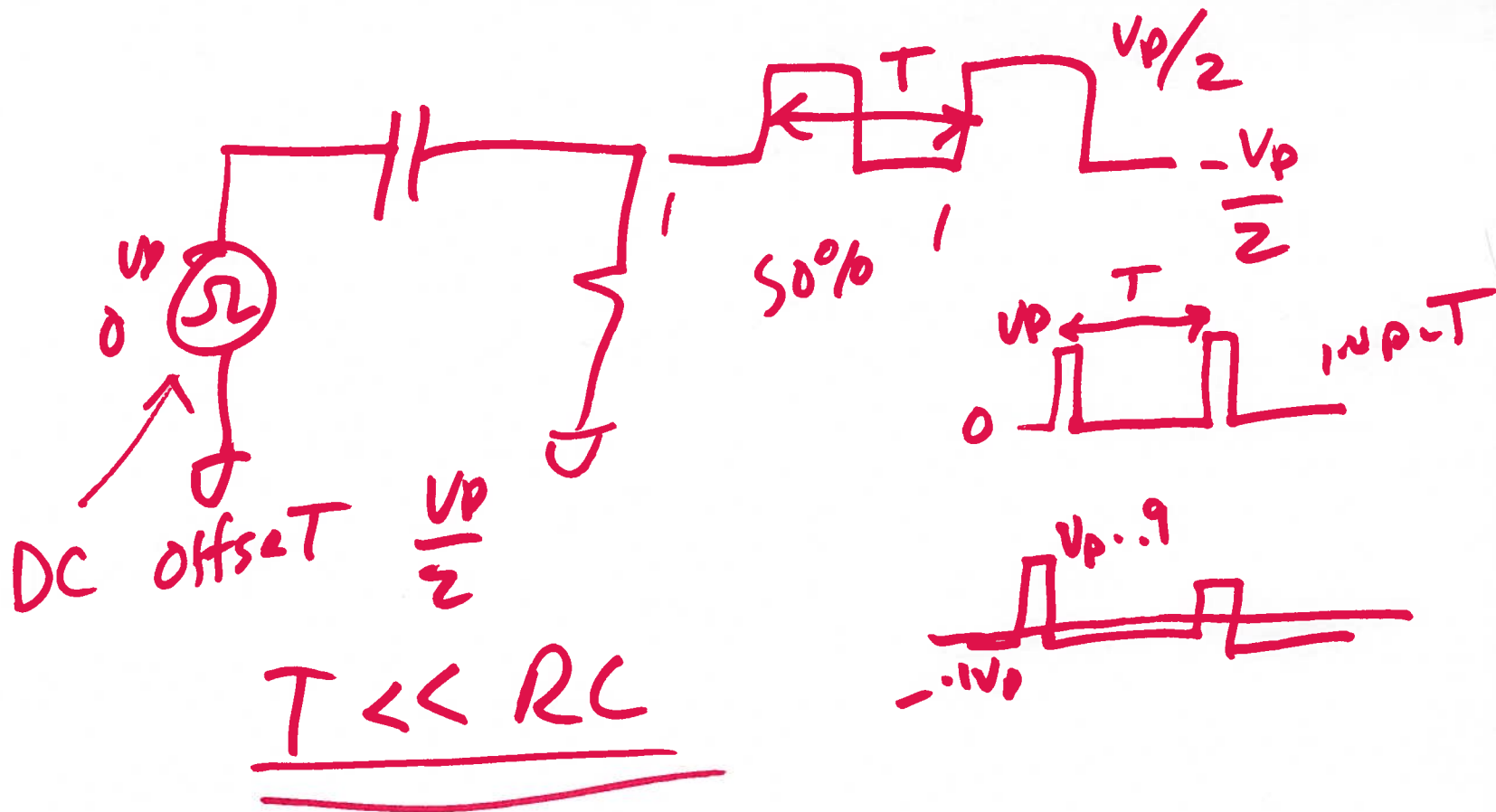
4)



$T \gg RC$

So has a chance to decay

5)



$$V_{pp} = V_p$$

$$DC \text{ offset} = \frac{V_p}{2}$$

b)