Post-lab 3. Xiangbo Cai

1. Yes. the voltage follower should have produced 590mV based on our calculation and it did matched the data we observe

2. The op-amp has an output voltage swing limitation due to internal transistor Therefore, the output voltage will drop and not reach +15V/-15V

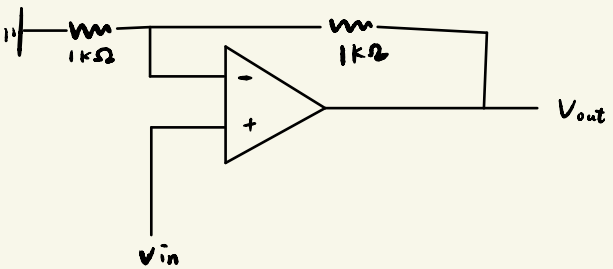
3. Based on my data. $\frac{V_2}{V_1} = \frac{1.37}{1.93} = 0.71 \Rightarrow dB = 20\log_{10}(0.71) = -2.97\,dB \approx -3dB$

This is very close to -3 dB, just expected as cutoff frequency

4. No. it's not wise to do that.

At cutoff frequency, the filter's amplitude is already reduced by 3 dB That means your 10 kHz signal would be noticeably attenuated and phase-shifted

5.



Extra Credit:

By definition $dB = 10 \log_{10}\left(\frac{P_2}{P_1}\right)$ P_2, P_1 are power level

Since $P = V^2/R \Rightarrow \frac{P_2}{P_1} = \frac{V_2^2/R}{V_1^2/R} = \left(\frac{V_2}{V_1}\right)^2$

$\Rightarrow dB = 10 \log_{10}\left(\frac{P_2}{P_1}\right) = 10 \log_{10}\left(\left(\frac{V_2}{V_1}\right)^2\right) = 20 \log_{10}\left(\frac{V_2}{V_1}\right)$

Therefore voltage in $dB = 20 \log_{10}\left(\frac{V_2}{V_1}\right)$