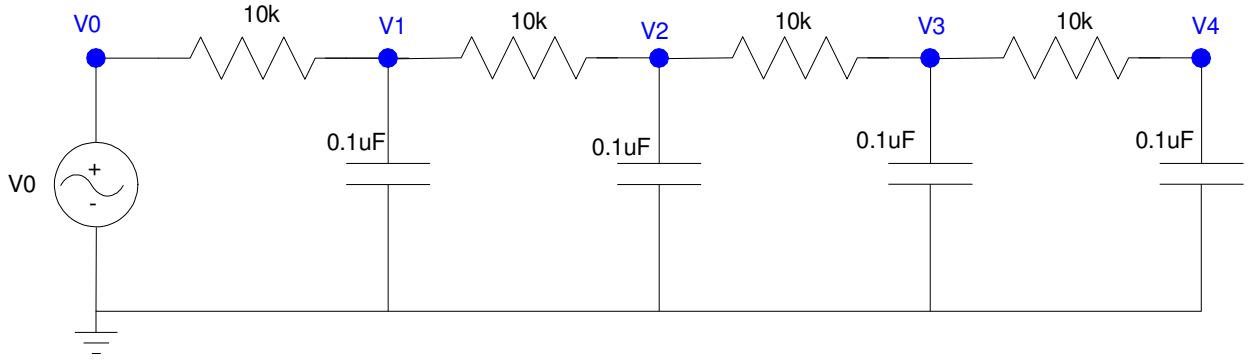
EE 206: Lab #8

Phasors and RC Circuits

Build the following 4-stage RC filter



1) Set the input to 5Vp 100Hz sine wave

Measure the signal at V1 .. V4

Express V1 .. V4 as a phasor assuming

V0 = 5 + j0

V0	V1	V2	V3	V4
5 + j0				

2) Set the input to 5Vp 200Hz sine wave

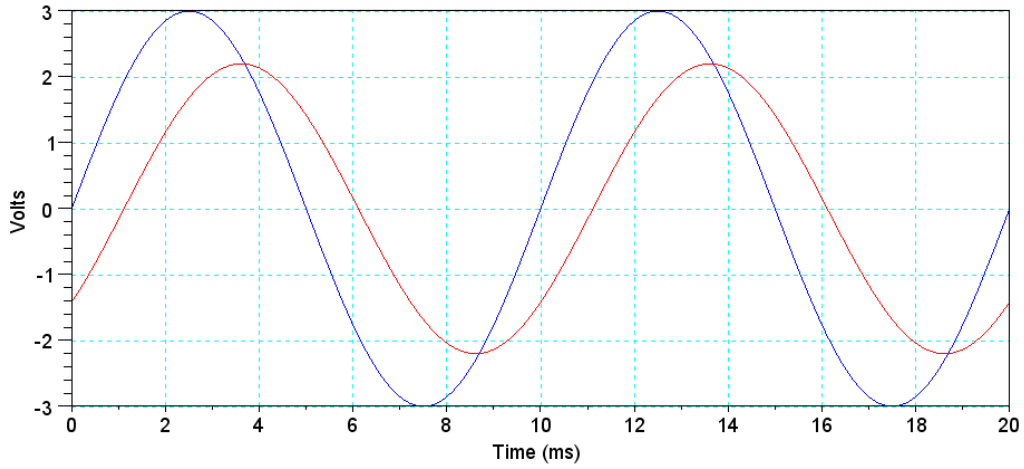
Measure the signal at V1 .. V4

Express V1 .. V4 as a phasor assuming

V0 = 5 + j0

V0	V1	V2	V3	V4
5 + j0				

Sample Calculations: To measure the gain and phase shift at 100Hz, display both Vin and Vout on the oscilloscope. For example, if the traces look like the following:



Sample Voltages: Vin (blue) and Vout (red)

Define the input (blue) curve to be 0 degree reference. Since it's peak is 3.0V

$$V_{blue} \equiv 3\angle 0^0$$

The output (red) is 2.2V.

$$V_{red} = 2.2\angle\theta$$

Phase Calculations:

One cycle is 360 degrees. The output (red line) is delayed from the input by

$$\theta = \left(\frac{\text{1ms delay}}{\text{10ms period}}\right) \cdot 360^0 = -36^0$$

(negative phase is a delay, positive phase is a time advance)

So, the phasor representation for the red curve is

$$V_{red} = 2.2\angle -36^0$$