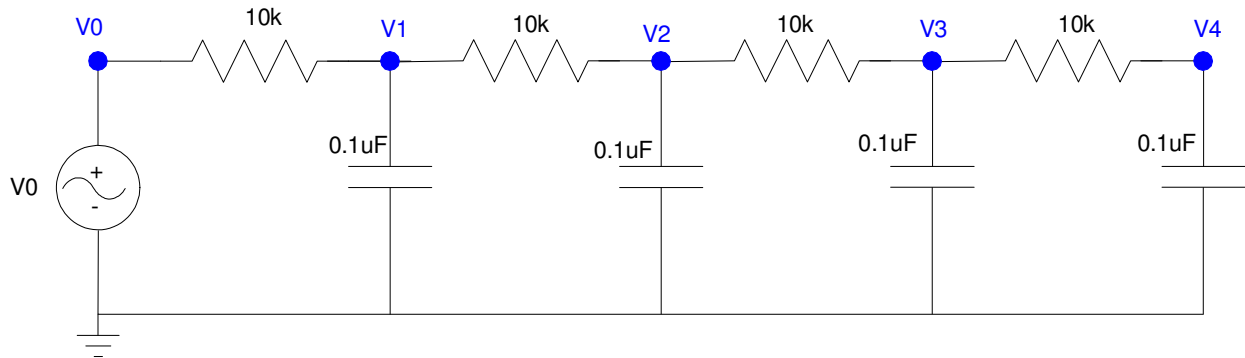


ECE 211: Lab #8

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

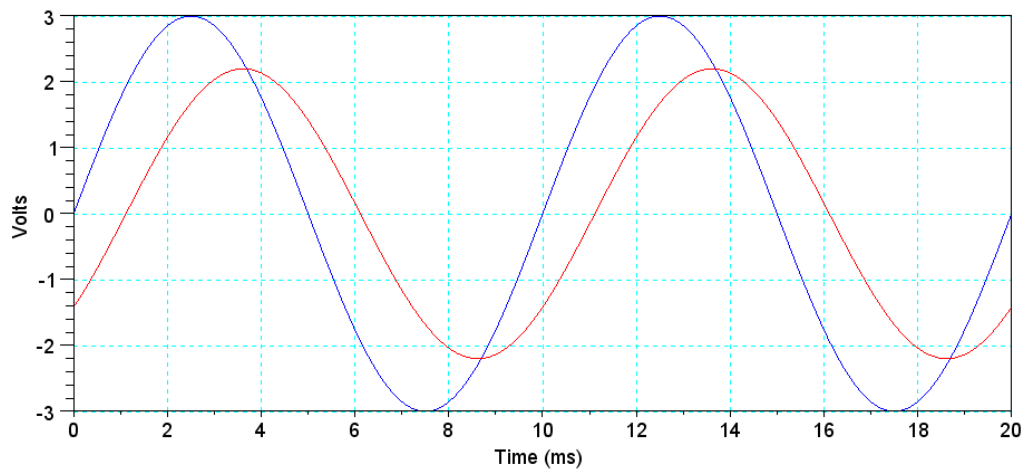
Measure the signal at V1 .. V4

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 V_{in} and V_{out} on the oscilloscope. For example, if the traces look like the following:



Sample Voltages: V_{in} (blue) and V_{out} (red)

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

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

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

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

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

So, the phasor representation for the red curve is

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