$$P_{R3} = V_{R3} \cdot I_2 = 0.4V \cdot 0.04mA = 16\ \mu W$$

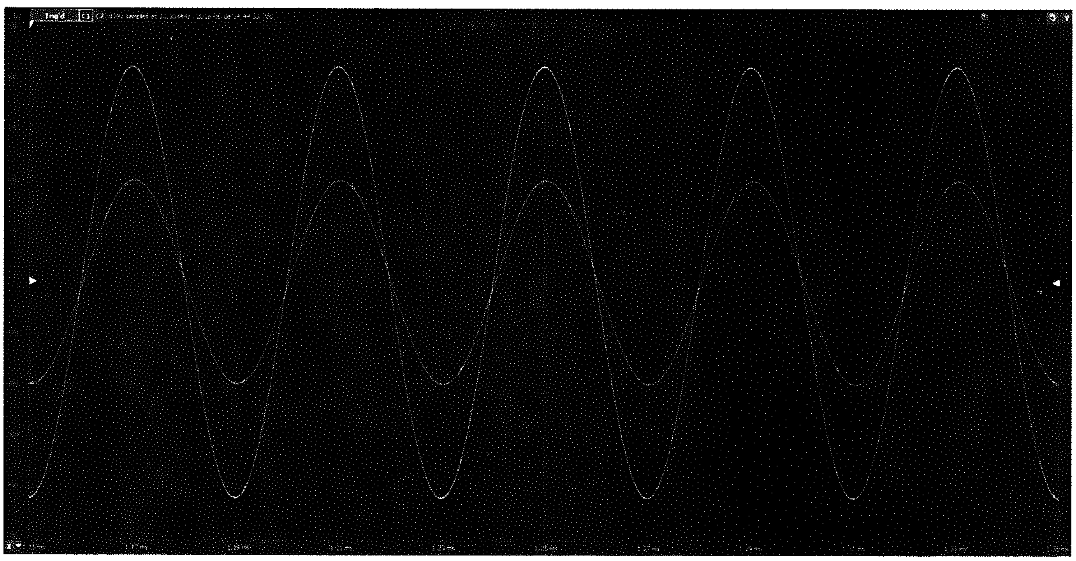
$$P_{R4} = V_{R4} \cdot I_3 = 0.21V \cdot 0.0019mA = 0.399\ \mu W$$

$$P_{R5} = V_{R5} \cdot I_3 = 0.19V \cdot 0.0019mA = 0.361\ \mu W$$

iv. Replace the 5V DC source with a sinusoidal source with 5V amplitude and a 0V offset. Using the two pins for the oscilloscope on the Analog Discovery 2, measure V_1 and V_2, and superimpose both waveforms. Measure the phase difference between these 2 voltage waveforms.

Solution:

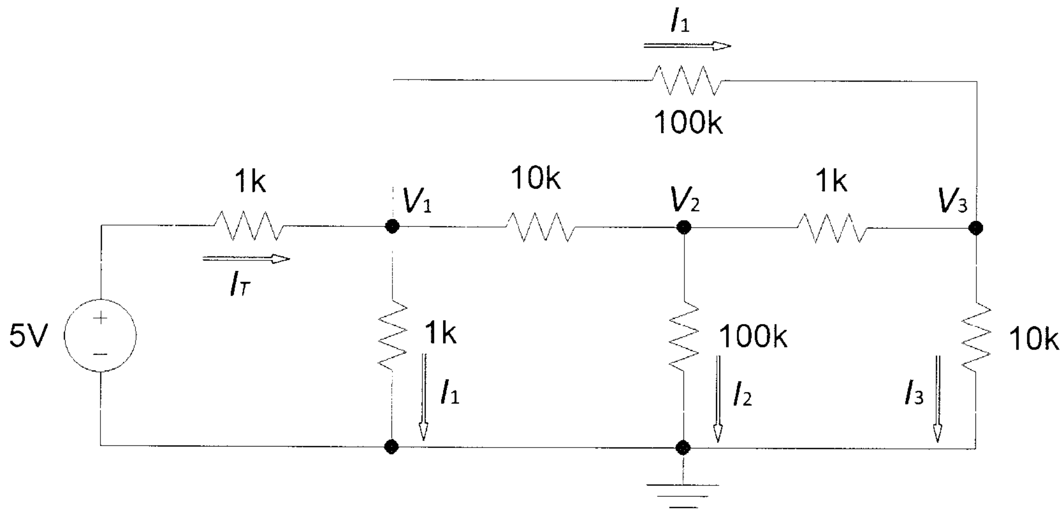
The waveforms measured on the analog discovery are shown below:



The phase difference between the two voltage waveforms is zero. As seen in the waveforms shown above, both waveforms are in phase and no shift is evident, due to the circuit being a purely resistive network.

Experiment:

i. Given the following circuit, calculate V_1, V_2, V_3, I_T, I_1, I_2, I_3, I_4 using nodal analysis.



ii. Using the Analog Discovery 2, measure the voltages and currents in the circuit and compare them to the theoretical values from part i.

iii. What is the ratio of input voltage (5V) to V_1, V_2, and V_3?

iv. Change the input from the 5V DC source to a triangular waveform, with a frequency of 2.5kHz, amplitude of 2.5V, and an offset of 2V. Using the oscilloscope, plot the input voltage on channel 1, and the voltage V_1 on channel 2. Include a screenshot in your report with both channel 1 and channel 2 enabled.

v. Add a custom math channel in the oscilloscope to measure the ratio of the input waveform to the waveform at V_1. How does this ratio compare to the ratio computed for V_1 in part iv? Include a screenshot in your report with only the math channel enabled.