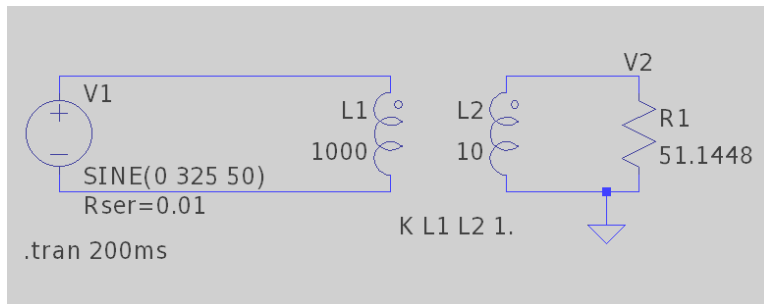


## Assignment 2 - Transformers

Forjanic Remy (511448), EEL1V.IB

$$R_1 = \frac{511448}{10000} = 51.1448\Omega \quad f = 50\text{Hz}$$

### Question 1



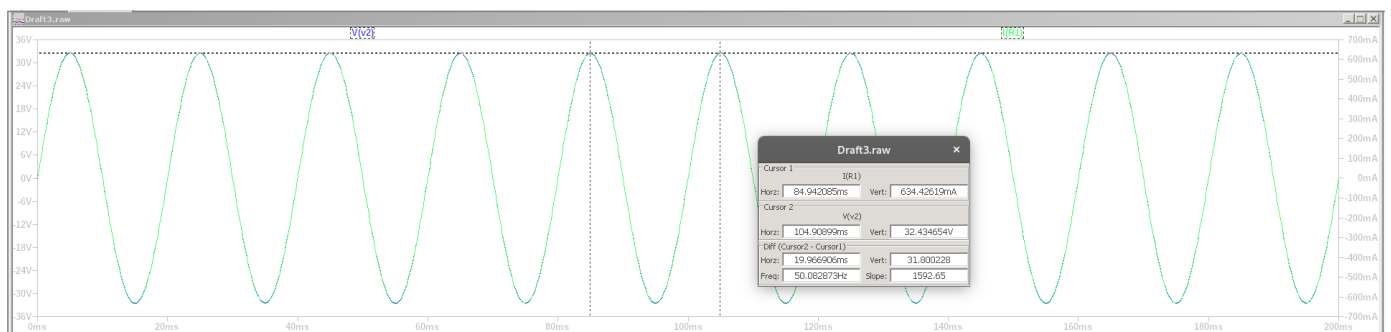
Calculate the turns ratio of the transformer

$$a = \frac{\sqrt{10}}{\sqrt{1000}} = 0.1$$

Calculate the secondary voltage and current

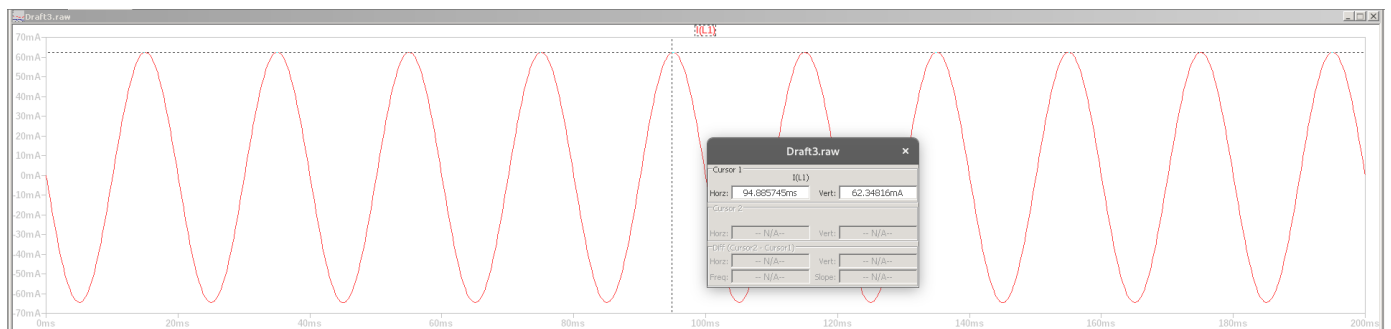
$$V_2 = V_1 \cdot a = 325 \cdot 0.1 = 32.5\text{V}$$

$$I_2 = \frac{V_2}{R_1} = \frac{32.5}{51.1448} = 0.635\text{A} = 635\text{mA}$$



Calculate the primary current

$$I_1 = I_2 \cdot a = 0.635 \cdot 0.1 = 0.0635\text{A} = 63.5\text{mA}$$



What is the value of the resistance as seen by the source?

$$R' = \frac{R_1}{a^2} = \frac{51.1448}{0.01} = 5114.48\Omega$$

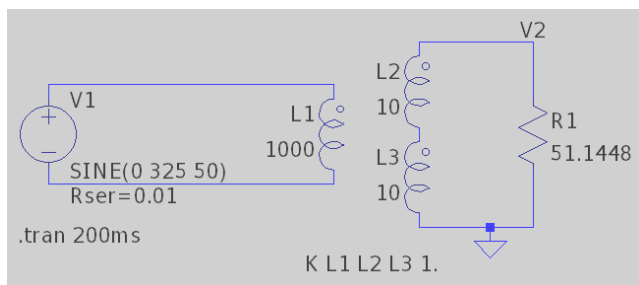
Simulate the transformer and verify the calculation

$$I_2 = 634.4\text{mA} \approx 635\text{mA}$$

$$V_2 = 32.4\text{V} \approx 32.5\text{V}$$

$$I_1 = 62.3\text{mA} \approx 63.5\text{mA}$$

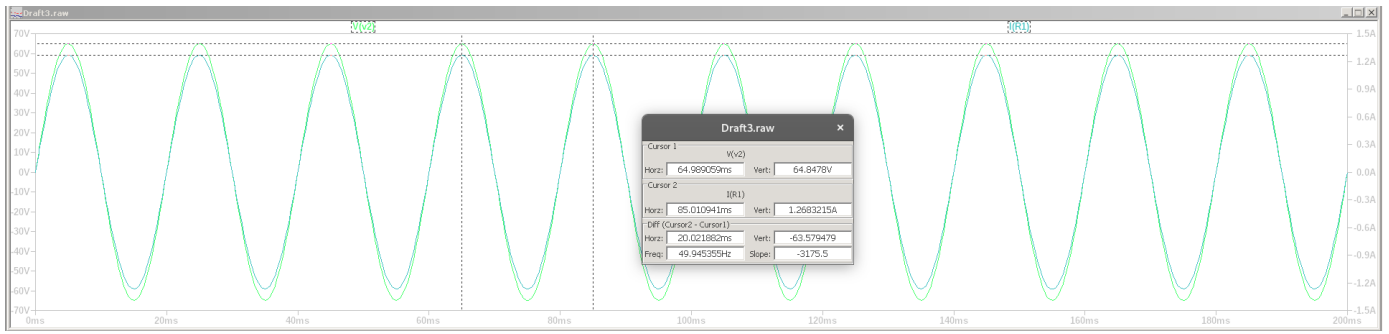
### Question 2



Calculate the secondary voltage and current

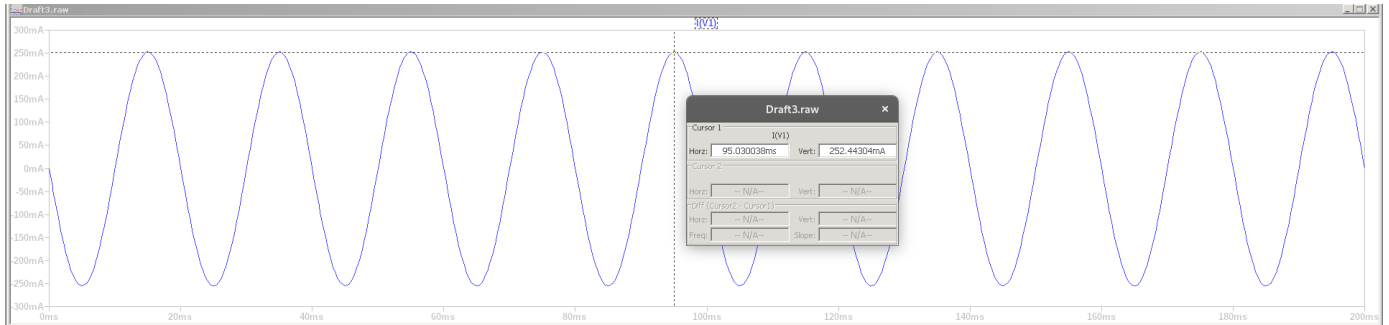
$$V_2 = V_1 \cdot \frac{\sqrt{10} + \sqrt{10}}{\sqrt{1000}} = 325 \cdot 0.2 = 65\text{V}$$

$$I_2 = \frac{V_2}{R_1} = \frac{65}{51.1448} = 1.27\text{A}$$



Calculate the primary current

$$I_1 = I_2 \cdot a = 1.27 \cdot 0.2 = 0.255A = 255mA$$



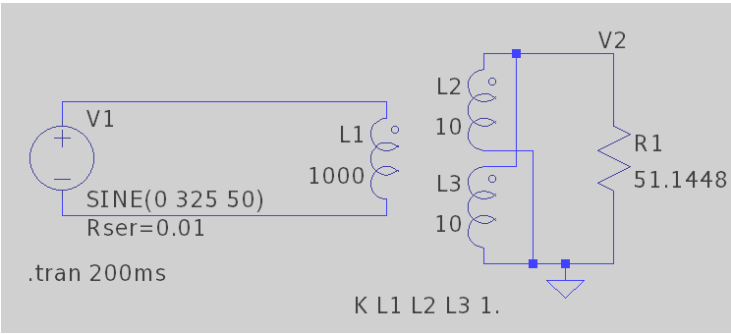
Simulate the transformer and verify the calculation

$$I_2 = 1.27mA \approx 1.27A$$

$$V_2 = 64.8V \approx 65V$$

$$I_1 = 252.4mA \approx 255mA$$

Question 3

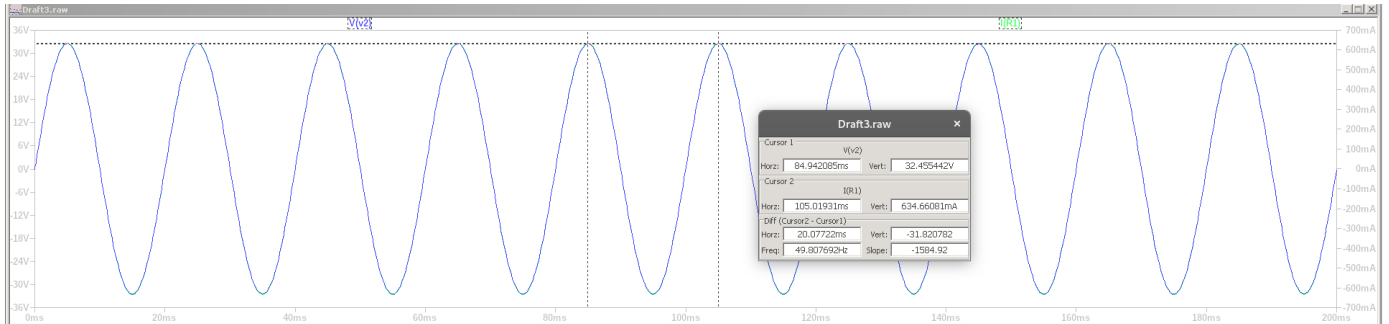


Calculate the secondary voltage and current

$$V_2 = V_1 \cdot \frac{\sqrt{10}}{\sqrt{1000}} = 325 \cdot 0.1 = 32.5V$$

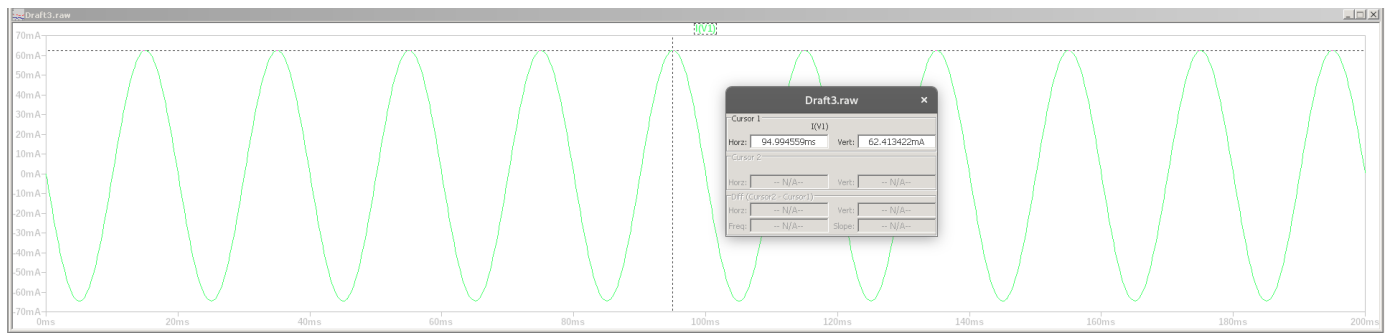
Since the power of the input source stays the same, the current is also the same as in the 1st Question, therefore:

$$I_2 = 0.635mA$$



Calculate the primary current

$$I_1 = I_2 \cdot a = 0.635 \cdot 0.1 = 0.0635A = 63.5mA$$



Simulate the transformer and verify the calculation

$$I_2 = 634.6mA \approx 635mA$$

$$V_2 = 32.5V \approx 32.5V$$

$$I_1 = 62.4mA \approx 63.5mA$$