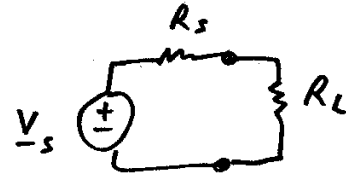


Homework 10: Supplemental Problems

Problem 1:

The voltage source in the circuit below is sinusoidal with $v_s(t) = 10 \cdot \sqrt{2} \cos(500t)$ V so the RMS phasor is $V_s = 10 \angle 0^\circ$ V.

- (a) Suppose the load resistor R_L is connected directly to the source, without the transformers. What is the average power absorbed by R_L ?



- (b) Now suppose the transformers are connected between the source and R_L , with $R_0 = 100$ ohms and a in the range from 1 to 10.

- What value of a will maximize the average power absorbed by R_L ?
- What is the average power absorbed by R_L for this value of a ?

Hint: Be careful, and think before applying the formulas!

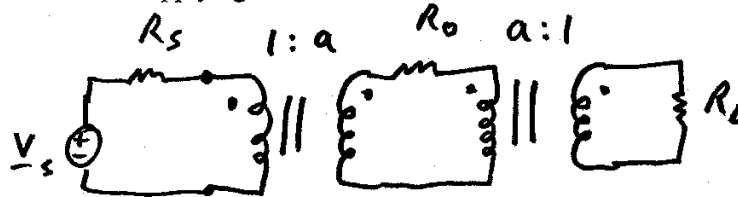
$$V_s = 10 \angle 0^\circ \text{ V (rms)}$$

$$R_s = 10 \Omega$$

$$R_L = 20 \Omega$$

$$R_0 = 100 \Omega$$

$$1 \leq a \leq 10$$



Problem 2:

The following ideal transformer circuit is shown in the frequency domain for sinusoidal steady-state conditions. The voltage source phasor is 10 V (peak amplitude). Find the phasor of the **voltage** across the 2 ohm resistor, V_L , and the phasor of the **current** through the 2 ohm resistor. Be sure to indicate the **direction** of your current on the circuit diagram.

