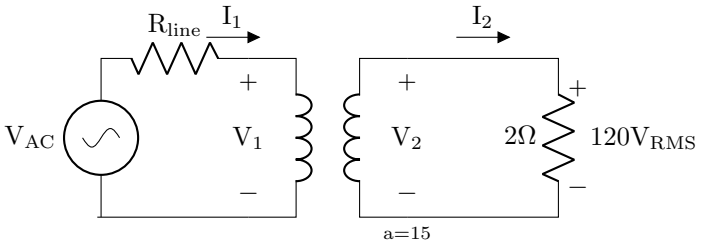
1. Given the following AC power system with an ideal transformer, with a load resistance of $R_{load} = 2\Omega$, a turns ratio of a = 15, and a $R_{line} = 36.49\Omega$, answer the following questions:



(a) If we desire the load voltage to be $120V_{rms}$, find the load power and the load current. Since this is a resistor, use real power.

$P_{load} =$ 7.20 KW

$I_{load} =$ 60.0 A

(b) Find the voltage and current required on the primary (1) side of the transformer.

$V_1 =$ 1.80 KV

$I_1 =$ 4.00 A

(c) Determine the system efficiency.

$\eta =$ 92.5%

(d) Use KVL to establish the required source voltage.

$V_s =$ 1.95 KV

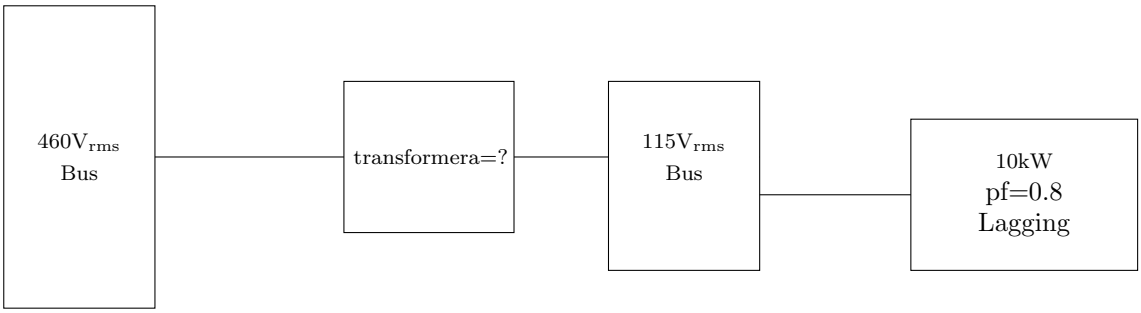
2. Assume you want to increase the transmission efficiency of Problem 1 to 97.5% by decreasing R_{line}, find the required value.

$R_{line} =$ 11.54 Ω

3. Assume you want to increase the transmission efficiency of Problem 1 again to 97.5%, this time by changing the turns ratio, a. Find the new turns ratio.

$a =$ 26.67

4. Analyze the following power delivery system.



(a) Find the transformer turns ratio (a).

$a =$ 4

(b) Find the RMS current drawn from the 115V$_{rms}$ bus, then determine the corresponding current drawn from the 460V$_{rms}$ bus.

$I_{115} =$ 109 A

$I_{460} =$ 27.2A