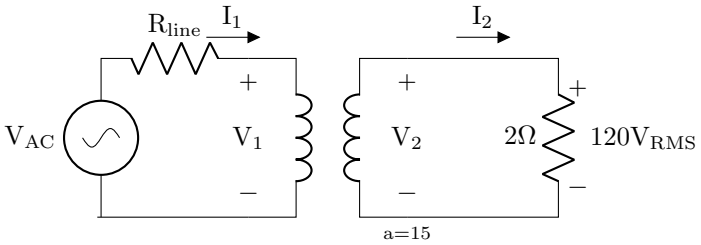
1. Given the following AC power system with an ideal transformer, with a load resistance of $R_{load} = 2\Omega$, a turns ratio of a = 15, and a $R_{line} = 36.49\Omega$, answer the following questions:



(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.

$P_{load} =$

$I_{load} =$

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

$V_1 =$

$I_1 =$

(c) Determine the system efficiency.

$\eta =$

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

$V_s =$

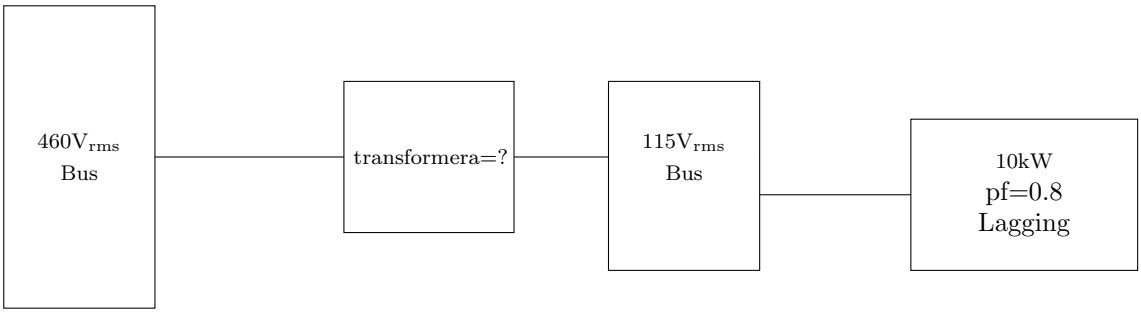
2. Assume you want to increase the transmission efficiency of Problem 1 to 97.5% by decreasing R_{line}, find the required value.

$R_{line} =$ ____

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.

$a =$ ____

4. Analyze the following power delivery system.



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

$a =$

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

$\text{I}_{115} =$

$\text{I}_{460} =$