

Ch. 15 Prob. 48

$$V_s = 12V$$

$$P = 50W$$

$$V_p = 110V$$

a) Find the rms current in the secondary

Assuming the voltages are in rms, then

$$P = I_{rms} V_{rms} \rightarrow I_{rms} = \frac{P}{V_{rms}}$$

current in the secondary is

$$I_s = \frac{P}{V_s} = \frac{50W}{12V} = \boxed{4.17 A_{rms}}$$

b) Find the rms current in the primary.

Assuming the transformer does not ~~lose~~ lose any power,

$$\cancel{P = P} \quad P = I_p \cdot V_p$$

$$I_p = \frac{P}{V_p} = \frac{50W}{110V} = \boxed{0.455 A_{rms}}$$

c) Find the ratio of primary to secondary turns

$$V_s = \frac{N_s}{N_p} V_p \rightarrow \frac{N_p}{N_s} = \frac{V_p}{V_s} = \frac{110V}{12V} = \boxed{9.2}$$

d) Find the resistance of the train.

$$\text{By Ohm's Law } V_s = I_s \cdot R \rightarrow R = \frac{V_s}{I_s}$$

$$R = \frac{12V}{4.17A} = \boxed{2.88 \Omega}$$

e) Resistance seen by the source

$$R = \frac{V_p}{I_p} = \frac{110V}{0.455A} = \cancel{242} \boxed{242 \Omega}$$