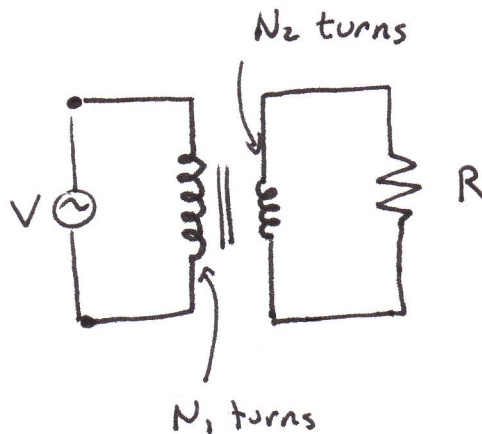


PHY 122 HW 10

1. What is the distinction between which side of a transformer is the primary or secondary coil? Could it easily be switched around and operated the opposite way? What would change?
2. Power lines that deliver power to your dorms are held at thousands of volts. Since $V = IR$, is it true that the current through wires is also very high? Explain.
3. In the figure below, a resistor R is attached to the secondary coil of a transformer. If the resistor dissipates a power of P , what is the voltage V in the primary coil?



4. Consider a straight wire of radius a (picture a cylinder) that carries a current I uniformly across its cross sectional area.
 - (a) What is the magnetic field energy density inside the wire as a function of radius?
 - (b) What is the total magnetic field energy per unit length inside the wire? You may find this volume integral useful:

$$\int f(r) dV = 2\pi\ell \int f(r) r dr$$