Using the observation that electric field in a conductor is proportional to current density (a.k.a. Ohm's Law), can you derive the formula V=IR?

Suppose I have two wires:

- one has a radius of $r_1 = 0.100\ m$, a length of $l_1 = 0.100\ m$, and a resistivity of $\rho_1 = 5.00\ \Omega * m$.
- a second wire has a radius of $r_2 = 0.200\ m$, a length of $l_2 = 0.190\ m$, and a resistivity of $\rho_2 = 5.30\ \Omega * m$.

Which wire has a greater resistivity? Which has a greater resistance?

Consider the circuit below (which contains a non-ideal battery).
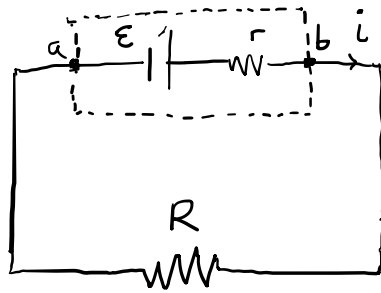
What is the potential difference between points a and b?