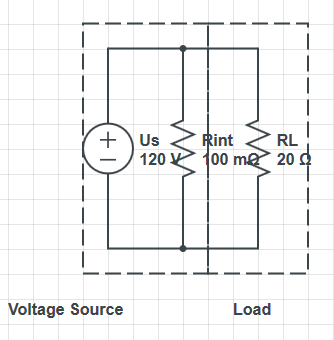
**Assignment 17** (2 points)

Problem: A voltage supply of 120V has an internal resistance of 0.1Ω. It is connected to a load using two copper cables. The cable has a length of 30 m and a cross-section of 1mm2. The resistance of the load is 20Ω. What current flows in the circuit? What will be the voltages at the external contacts of the voltage supply and at the load?

Remember the resistivity r of the cooper is 0.0175Ω. mm2 / m

Solution:





In fact we have a series-parallel connection in here. Voltage drops on both internal resistance branch and on load branch will be the same, but currents will be different. Let’s calculate it.

We can calculate a total resistance of load branch as series connection between cables and load resistance.

To find a resistivity of a cable itself, we should use this formula



Everything in here is known already



We have two cables, so the total resistance for load is:



Now we can imagine it as a big ideal resistor. Now we can find total resistance of a *circuit:*



Now we can find total current.

