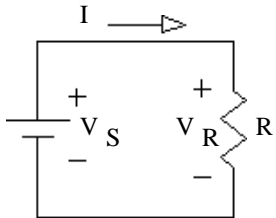Homework solutions will be posted in a glass case west of the ECE office. Graded homework, labs and exams will be returned to a file cabinet in MEB 3305, filed by your alphabetically assigned number.
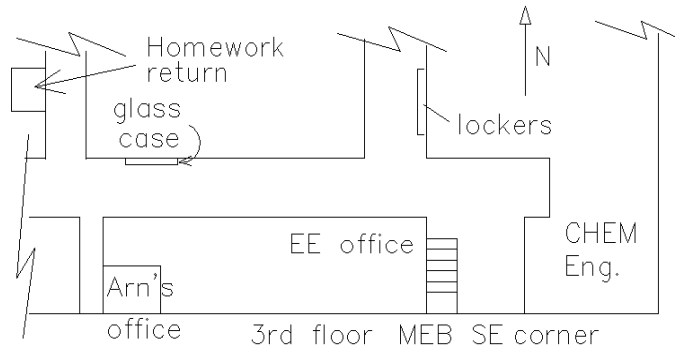
The following problems on your own paper. Since you have the answers, you must show your work to get credit.

1. Ohm's law

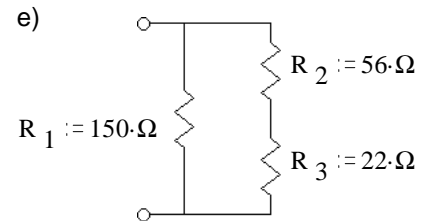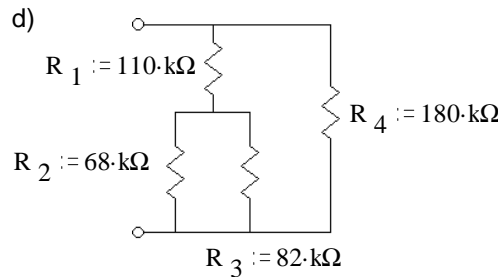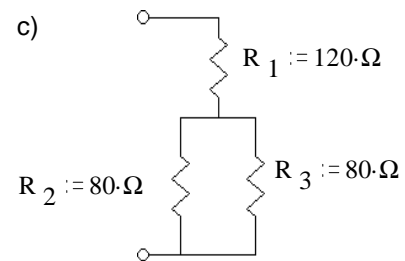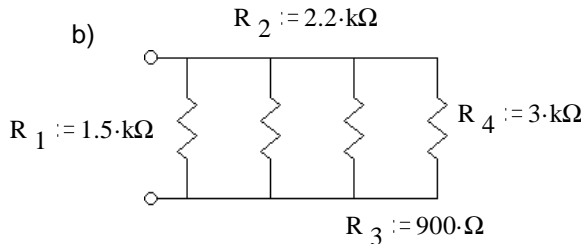Consider the figure at left. For each of the cases below, find the missing value.

$I \longrightarrow$

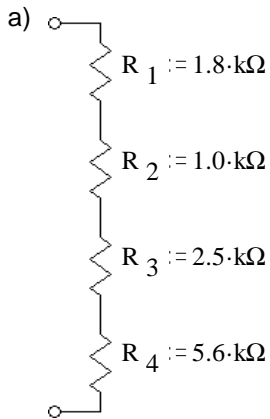$+ \ V_S \ - \quad + \ V_R \ - \quad R$

a) $I := 0.01 \cdot A$ $V_R := 4 \cdot V$ $R = ?$

b) $I := 50 \cdot mA$ $R := 560 \cdot \Omega$ $V_R = ?$

c) $V_R := 12 \cdot V$ $R := 1.5 \cdot k\Omega$ $I = ?$

2. Power and Ohm's law.   Same circuit as above.   For each of the cases below, find the missing values.

a) $I := 5 \cdot mA$ $R := 2 \cdot k\Omega$ $V_R = ?$ $P_R = ?$

b) $V_R := 25 \cdot V$ $R := 100 \cdot \Omega$ $I = ?$ $P_R = ?$

c) $V_R := 20 \cdot V$ $I := 0.01 \cdot A$ $R = ?$ $P_R = ?$

d) $P_R := 900 \cdot W$ $V_R := 120 \cdot V$ $I = ?$ $R = ?$ Toaster

e) $P_R := 1500 \cdot W$ $R := 9.6 \cdot \Omega$ $I = ?$ $V_S = ?$ Hair drier   Ignore the fact that these run on AC

f) $P_R := 2500 \cdot W$ $I := 10.5 \cdot A$ $R = ?$ $V_S = ?$ Electric oven

3. Find the equivalent resistance of each of these networks, i.e. what would an ohmmeter read if hooked to the terminals.

a) $R_1 := 1.8 \cdot k\Omega$, $R_2 := 1.0 \cdot k\Omega$, $R_3 := 2.5 \cdot k\Omega$, $R_4 := 5.6 \cdot k\Omega$

b) $R_2 := 2.2 \cdot k\Omega$, $R_1 := 1.5 \cdot k\Omega$, $R_4 := 3 \cdot k\Omega$, $R_3 := 900 \cdot \Omega$

c) $R_1 := 120 \cdot \Omega$, $R_2 := 80 \cdot \Omega$, $R_3 := 80 \cdot \Omega$

d) $R_1 := 110 \cdot k\Omega$, $R_4 := 180 \cdot k\Omega$, $R_2 := 68 \cdot k\Omega$, $R_3 := 82 \cdot k\Omega$

e) $R_2 := 56 \cdot \Omega$, $R_1 := 150 \cdot \Omega$, $R_3 := 22 \cdot \Omega$

Answers

1. a) $R := 400 \cdot \Omega$ b) $V_R := 28 \cdot V$ c) $I := 8 \cdot mA$

2. a) $V_R := 10 \cdot V$ $P_R := 50 \cdot mW$ b) $I := 0.25 \cdot A$ $P_R := 6.25 \cdot W$ c) $R := 2.0 \cdot k\Omega$ $P_R := 200 \cdot mW$

    d) $I := 7.5 \cdot A$ $R := 16 \cdot \Omega$ e) $I := 12.5 \cdot A$ $V_S := 120 \cdot V$ f) $R := 22.7 \cdot \Omega$ $V_S := 238 \cdot V$

3. a) $R_{eq} := 10.9 \cdot k\Omega$ b) $R_{eq} := 390 \cdot \Omega$ c) $R_{eq} := 160 \cdot \Omega$

    d) $R_{eq} := 81 \cdot k\Omega$ e) $R_{eq} := 51.3 \cdot \Omega$