Let's look at an example
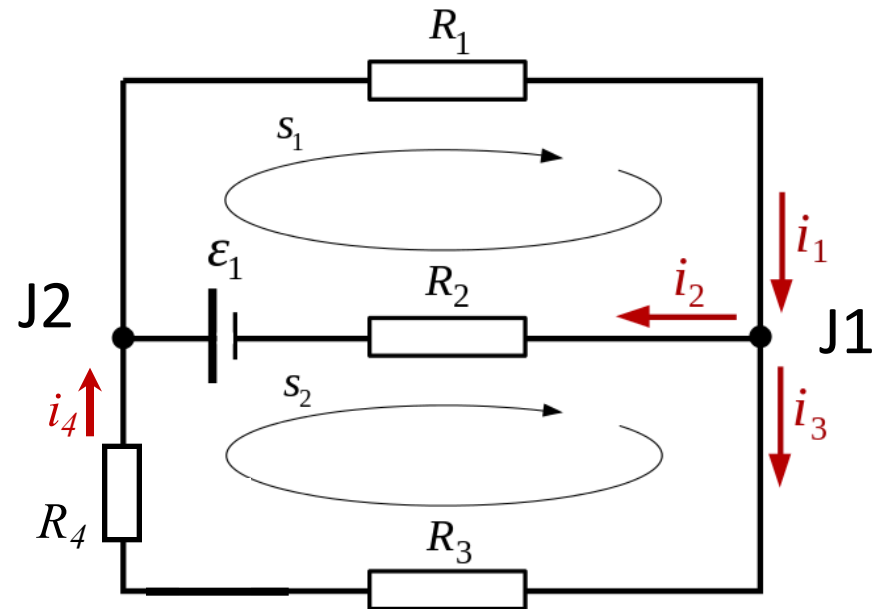
Write out Kirchhoff's
circuit laws for J1 & J2

$i1 - i2 - i3 = 0$

$-R2i2 + E1 - R1i1 = 0$

$-R3i3 - R4i4 - E1 + R2i2 = 0$

$i4 = i3$

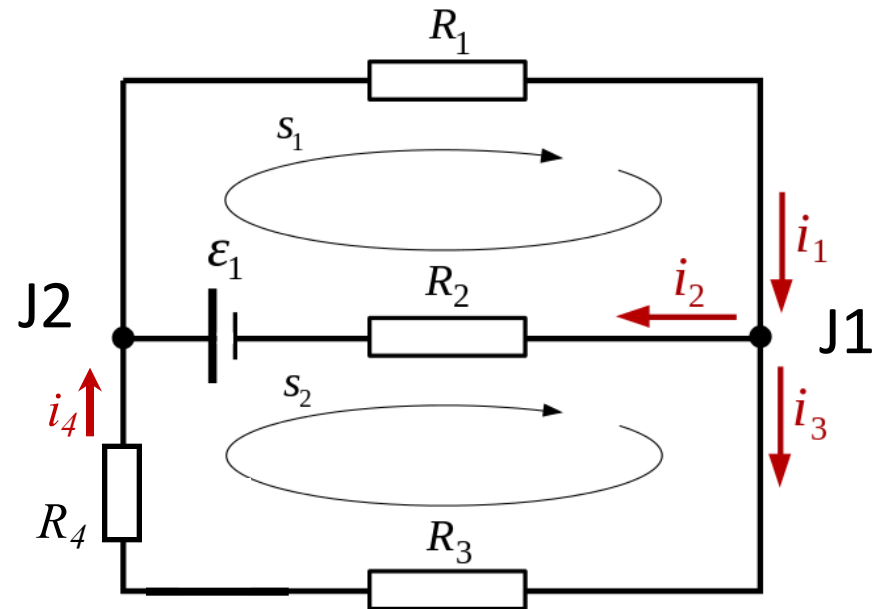# Write out Kirchhoff's circuit laws for J1 & J2

$i1 + (-i2) + (-i3) + 0i4 = 0$

$R1i1 + R2i2 + 0i3 + 0i4 = E1$

$0i1 + R2i2 - R3i3 - R4i4 = E1$

$0i1 + 0i2 + (-i3) + i4 = 0$

R1=330, R2=10620, R3=1614, R4=660 Ohms
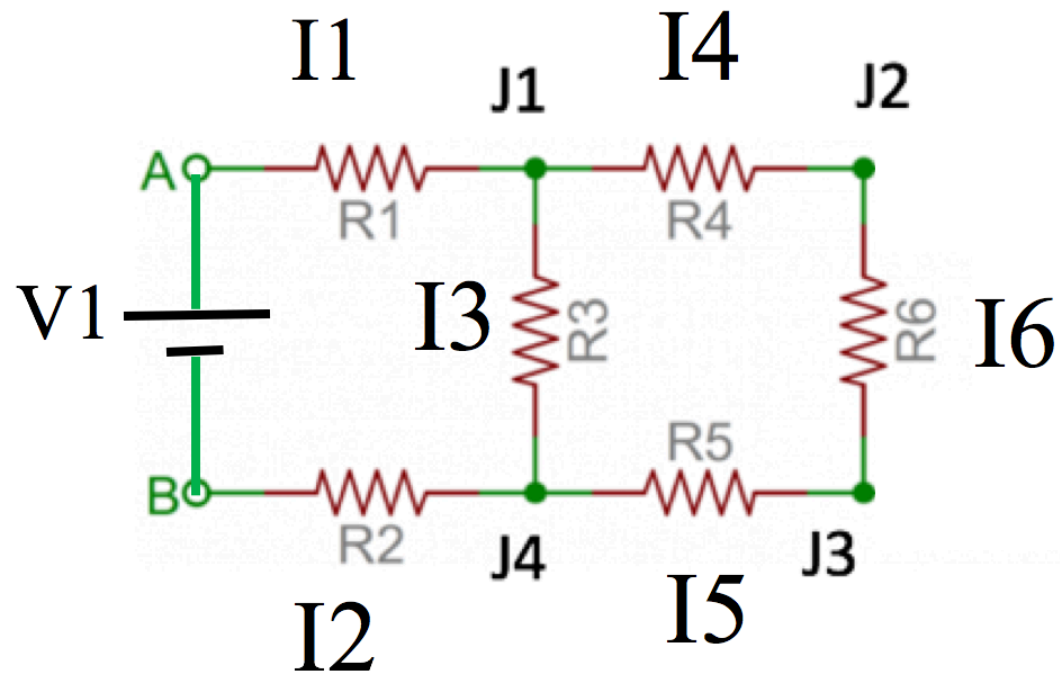
i1 = 379/946830, i2 = 217/473415, i3= i4 = -11/189366 Amps

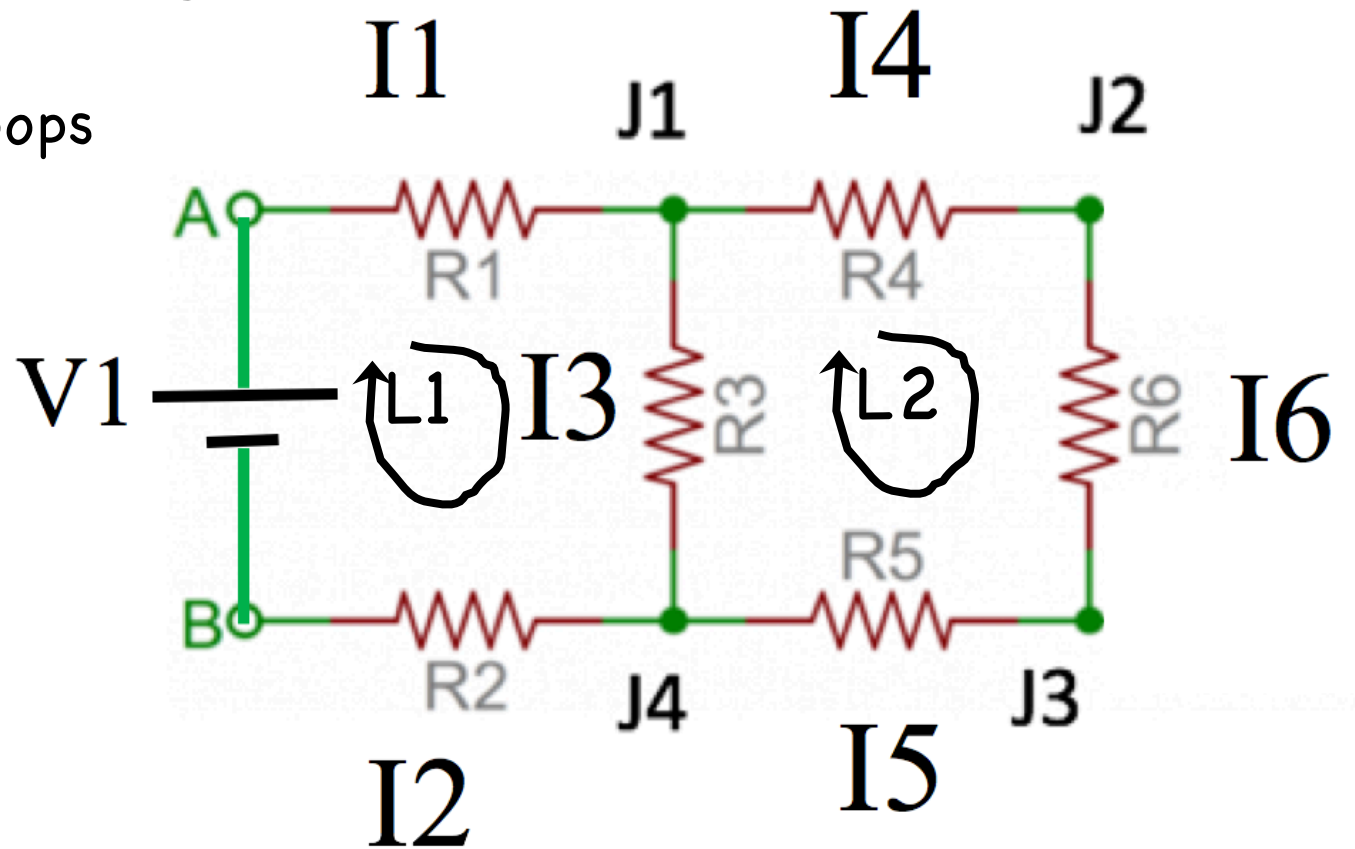see: http://onlinemschool.com/math/assistance/equation/matr/

Another example

Label Everything

Include Current Loops

Write out Kirchhoff's circuit laws for J1
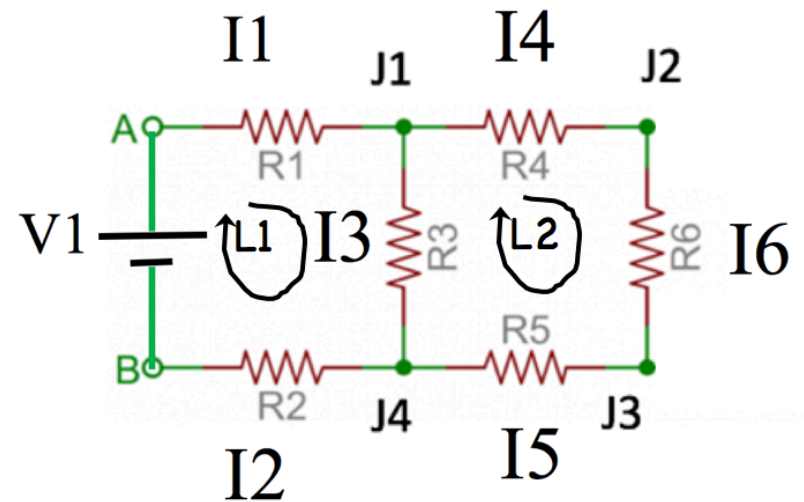
$$i1 - i3 - i4 = 0$$
$$i3 - i2 + i5 = 0$$

$$-R1i1 - R3i3 - R2i2 + V1 = 0$$

$$-R1i4 - R6i6 - R5i5 + R3i3 = 0$$

$$i4 = i5 = i6$$
$$-i4(R4+R5+R6) + R3i3 = 0$$
$$-3\,R4i4 + R3i3 = 0$$

See: https://en.wikipedia.org/wiki/Kirchhoff%27s_circuit_laws