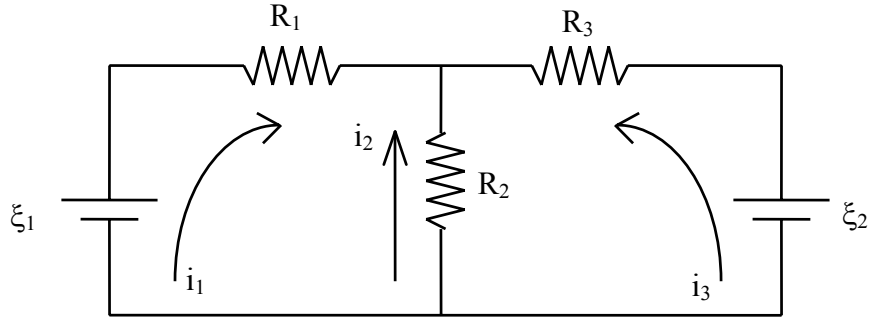
Solving Three Equations In Three Unknowns

(1)	$i_1 + i_2 + i_3 = 0$	
(2)	$\xi_1 - i_1R_1 + i_2R_2 = 0$	
(3)	$\xi_2 + i_2R_2 - i_3R_3 = 0$	
(4)	$(\xi_2-\xi_1) + i_1R_1 - i_3R_3 = 0$	(3) - (2)
(5)	$i_1R_2 + i_2R_2 + i_3R_2 = 0$	R_2 * (1)
(6)	$\xi_2 - i_1R_2 - i_3(R_2+R_3) = 0$	(3) - (5)
(7)	$(\xi_2-\xi_1)R_2 + i_1R_1R_2 - i_3R_2R_3 = 0$	R_2 * (4)
(8)	$\xi_2R_1 - i_1R_1R_2 - i_3R_1(R_2+R_3) = 0$	R_1 * (6)
(9)	$R_1\xi_2 + R_2(\xi_2-\xi_1) - i_3(R_1R_2 + R_2R_3 + R_1R_3) = 0$	(7) + (8)
(10)	$i_3 = \frac{R_1\xi_2 + R_2\xi_2 - R_2\xi_1}{R_1R_2 + R_2R_3 + R_1R_3} = \frac{2+4-2}{2+6+3}A = \frac{4}{11}A$	**solve (9) for i_3**
(11)	$i_1 = \frac{i_3R_2R_3 - R_2(\xi_2 - \xi_1)}{R_1R_2} = \frac{4/11*6-2}{2}A = \frac{1}{11}A$	**solve (7) for i_1, then use (10)**
(12)	$i_2 = -i_1 - i_3 = -\frac{1}{11} - \frac{4}{11} = -\frac{5}{11}A$	**solve (1) for i_2, use (10) and (11)**

$\xi_1 = 1V$	$R_1 = 1\Omega$
$\xi_2 = 2V$	$R_2 = 2\Omega$
	$R_3 = 3\Omega$



Notes:

- i_1 and i_3 are both positive so the directions given for currents i_1 and i_3 are correct.
- i_2 is negative so its current direction is the opposite of that given.
- Both batteries are supplying power because their currents are flowing out of the positive terminals.