Applications of Linear Algebra

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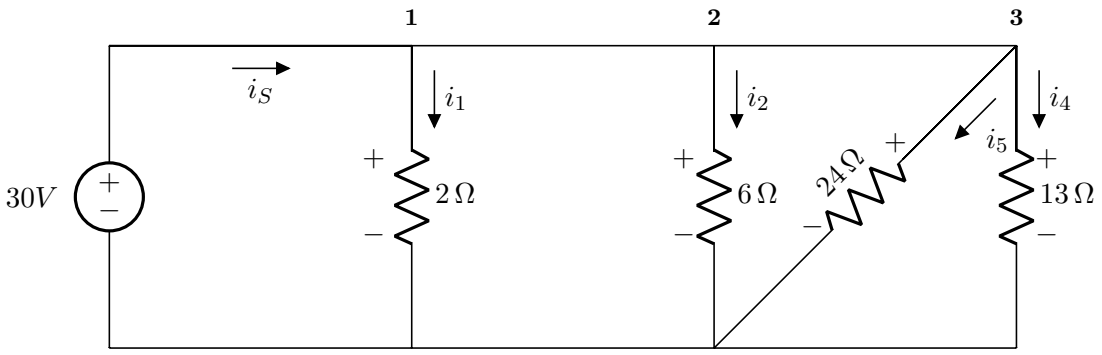
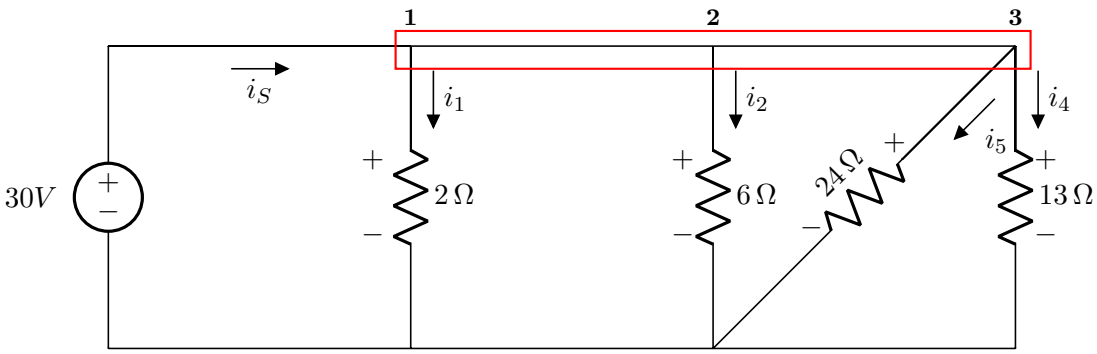
This paper will explore the applications of linear algebra, an interesting yet elegant field of applied mathematics. The applications themselves may be rather trivial to most readers, however the intent is to demonstrate how such applications may be solved, or approached more efficiently using linear algebra.

1 Circuit Applications

Let us consider the following circuit where the current flow through each load is unknown.



We proceed by applying Kirchoffs current/voltage laws to deduce a set of equations from which we can construct a matrix and reduce to RREF to obtain a solution to the unknown current values. To make our solution slightly more concise we will make use of a well known circuit technique whereby we treat the three nodes denoted in the circuit as a single node and proceed as follows,


1
2
3
i_S
i_1
i_2
i_4
i_5
$30V$
$2\,\Omega$
$6\,\Omega$
$24\,\Omega$
$13\,\Omega$