4. **Example Nodal Analysis**

Find the node voltages.

Find power absorbed by all elements.

![Node Diagram]

**Note:** Here there is a dependent current source. It depends on \( v_1 \), which is a node voltage, therefore we don't need another equation.

**3 Current**

1. \( \frac{v_1}{4} + \frac{v_1 - v_2}{2} - 2 = 0 \)

2. \( \frac{v_2 - v_1}{2} + \frac{v_2}{8} - \frac{v_1}{3} = 0 \)

**Simplify:**

1. \( v_1 + 2v_1 - 2v_2 = 8 \)
   \[ 3v_1 - 2v_2 = 8 \]

2. \( 12v_2 - 12v_1 + 3v_2 - 8v_1 = 0 \)
   \[ -20v_1 + 15v_2 = 0 \]
\[3v_1 - 2v_2 = 8\]
\[-20v_1 + 15v_2 = 0\]

\[
\begin{bmatrix}
3 & -2 \\
-20 & 15
\end{bmatrix}
\begin{bmatrix}
v_1 \\
v_2
\end{bmatrix} =
\begin{bmatrix}
8 \\
0
\end{bmatrix}
\]

\[V_1 = 24 \text{ V} \]
\[V_2 = 32 \text{ V}.\]

Powers:
\[P_{1n} = \frac{V_1^2}{4} = \frac{24^2}{4} = 144 \text{ W}\]
\[P_{2n} = \frac{(V_1 - V_2)^2}{2} = \frac{(24 - 32)^2}{2} = 32 \text{ W}\]
\[P_{3n} = \frac{V_2^2}{8} = \frac{32^2}{8} = 128 \text{ W}\]

\[\text{P_revisited} = 304 \text{ W}\]

\[\begin{array}{c}
2A \\
\text{V}_1
\end{array}
\]
\[P_{\text{supplied}} = 24 \times 2 = 48 \text{ W}\]

\[\begin{array}{c}
\frac{V_1}{3} \\
\text{V}_2
\end{array}
\]
\[P_{\text{supplied}} = 32 \times 8 = 256 \text{ W}\]

\[\text{Total Power supplied} = 48 + 256 = 304 \text{ W}\]