Problem 3.55  Find the Thévenin equivalent circuit at terminals \((a, b)\) for the circuit in Fig. P3.55.

Solution: Since all sources in the circuit are voltage sources, the mesh current by-inspection method can be applied:

\[
\begin{bmatrix}
8 & -2 & -2 \\
-2 & 8 & -2 \\
-2 & -2 & 8
\end{bmatrix}
\begin{bmatrix}
I_1 \\
I_2 \\
I_3
\end{bmatrix}
= 
\begin{bmatrix}
6 \\
-12 \\
-8
\end{bmatrix}
\]

Matrix inversion yields:

\[I_1 = -0.1 \text{ A}, \quad I_2 = -1.9 \text{ A}, \quad I_3 = -1.5 \text{ A}.\]

\[V_{\text{Th}} = V_{\text{oc}} = 4I_2 = 4(-1.9) = -7.6 \text{ V}.\]

Suppressing sources:
Further simplification leads to
\[ R_{\text{Th}} = 1.6 \, \Omega. \]
Hence, the Thévenin circuit is:

![Thévenin circuit diagram](image-url)