Problem 4

For the circuit find:

\[ V_3, V_1, V_2, I_1 \text{ and } I_2 \]

\[ \begin{array}{c}
\text{100 ohms} \\
\end{array} \]

\[ \begin{array}{c}
\text{+} \\
\text{-} \\
\text{+} \\
\text{-} \\
\text{+} \\
\text{-} \\
\end{array} \]

By now you should "see" several ways to solve for the unknowns. Let's demonstrate some of these.

A) Reduce the circuit to

\[ \begin{array}{c}
\text{100 ohms} \\
\end{array} \]

\[ \begin{array}{c}
\text{+} \\
\text{-} \\
\text{+} \\
\text{-} \\
\text{+} \\
\text{-} \\
\end{array} \]

\[ V_1 = 20 \times 100 \]
\[ = 2000 \text{ V.} \]

\[ V_0 = 20 \times 50 = 1000 \text{ V.} \]

\[ -V_S + V_1 + V_2 = 0 \]

\[ V_S = V_1 + V_2 = 3000 \text{ V.} \]

In this form we can solve for \( V_3, V_1, \text{ and } V_2 \) directly. Then "open up the circuit to find \( I_1 \) and \( I_2 \).

Do you understand where this equation comes from?
Problem 4 (cont)

A) "open" up the circuit.

\[ I_1 = I_2^2 \quad \frac{V_2}{100} = \frac{1000}{100} = 10 \, A \]

OR

B) By current division find \( I_1 \) and \( I_2 \).

In this case

\[ I_1 = I_2 = \frac{20}{2} = 10 \, A \]

[why?]

Now find \( V_s, V_1 \), and \( V_2 \)