Problem 3.13  Repeat Problem 3-12 after replacing the 5-Ω resistor in Fig. P3.12 with a short circuit.

Solution:

\[ \begin{align*}
&\text{KCL at node } V_1: \\
&\quad \frac{V_1 - 12.3}{10} + \frac{V_1}{4} + \frac{V_1 - V_2}{20} = 0.
\end{align*} \]

Also, in view of the short circuit,

\[ V_2 = 12.3 \text{ V}. \]

Hence,

\[ V_1 = 4.6125 \text{ V}, \]

\[ I_s = \frac{12.3 - V_1}{10} = \frac{12.3 - 4.6125}{10} = 0.77 \text{ A}. \]