Ex:

For the circuit shown, write three independent equations for the three mesh currents, \( i_1, i_2, \) and \( i_3 \). The quantity \( i_x \) must not appear in the equations.

**sol'n:** First, we define \( i_x \) in terms of mesh currents:

\[
i_x = i_2 - i_3
\]

Second, we look for current sources on the outside edges of the circuit, as these will define mesh current values.

There is a current source on the top edge that defines \( i_1 \):

\[
i_1 = i_s \tag{1}
\]

Third, we look for a super mesh. In other words, we look for a current source between loops. Here, there is no super mesh, and we write standard v-loop eqhs for \( i_2 \) and \( i_3 \).
\[ + V_g - i_2 R_1 + i_1 R_1 - i_2 R_2 + i_3 R_2 = 0V \quad (2) \]

\[ - i_3 R_2 + i_2 R_2 - \alpha(i_2 - i_3) - i_3 R_2 = 0V \quad (3) \]