ECE 1270
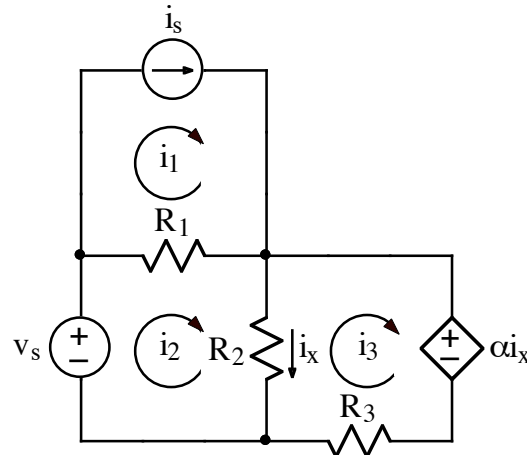Su 08

HOMEWORK #8 solution

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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:

$$i_1 = i_s \hspace{3cm} (1)$$

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 eqns for i_2 and i_3.

$$+ V_s - i_2 R_1 + i_1 R_1 - i_2 R_2 + i_3 R_2 = 0V \quad (2)$$

$$- i_3 R_2 + i_2 R_2 - \alpha(i_2 - i_3) - i_3 R_3 = 0V \quad (3)$$