

Name SOLUTION

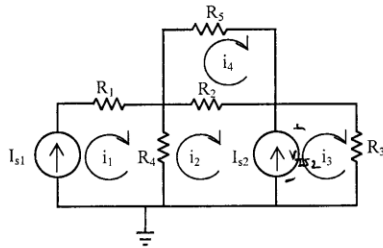
EE301 October 9, 2009

Quiz 5 – No Calculators – pencil (or pen) and paper only

Problem 1: Use Mesh Analysis

Given the circuit below, that I_{S1} , I_{S2} and R's are known.

- Which mesh current(s) are known?
- Which mesh current(s) are unknown?
- Which mesh current(s) are dependent?
- Write the equation(s) to solve the circuit by **mesh analysis**.
- Box the equation(s) you would use to solve the system and list the unknowns for which you are solving.
 - Reduce to the form of: $[R_1+R_2]i_1 + [R_3]i_2 = V_{S1}$ (just an example)
- Write an equation to solve for the voltage across R_2 in terms of mesh currents and resistors. Make sure to indicate polarity.



1.) $i_1 \rightarrow i_1 = I_{S1}$

2.) i_2, i_3, i_4

3.) i_2, i_3

Aux Eqn $i_3 - i_2 = I_{S2}$ Eq. 1

KVL M4

$$R_5 i_4 + R_2 (i_4 - i_2) = 0$$

$$\boxed{-R_2 i_2 + (R_2 + R_5) i_4 = 0} \text{ Eq. 2}$$

KVL M2

$$R_4 (i_2 - i_1) + R_2 (i_2 - i_4) + V_{I_{S2}} = 0$$

KVL M3

$$-V_{I_{S2}} + R_3 i_3 = 0$$

$$V_{I_{S2}} = R_3 i_3$$

COMBINED M2/M3 OR SUPERMESH

$$R_4 (i_2 - i_1) + R_2 (i_2 - i_4) + R_3 i_3 = 0$$

$$-R_4 i_1 + (R_2 + R_4) i_2 + R_3 i_3 - R_2 i_4 = 0$$

$$\boxed{R_4 I_{S1} = (R_2 + R_4) i_2 + R_3 i_3 - R_2 i_4} \text{ Eq. 3}$$

6.) $V_{R2} = R_2 (i_2 - i_4)$
 $\rightarrow + \frac{R_2}{M} -$