

Name SOLUTION

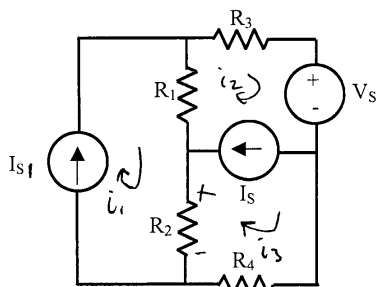
EE301 Feb. 20, 2009

Quiz 4 – No Calculators – pencil (or pen) and paper only

**Problem 1:** Use Mesh Analysis

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

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



1.)  $i_1$  IS KNOWN

$i_1 = I_{S1}$

2.)  $i_2, i_3$

3.)  $i_2, i_3$

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

KVL M2

$R_1(i_2 - i_1) + R_3 i_2 + V_S - V_{IS} = 0$

KVL M3

$R_4 i_3 + R_2(i_3 - i_1) + V_{IS} = 0$

$V_{IS} = -R_4 i_3 - R_2(i_3 - i_1)$

KVL M2/M3 (COMBINED) (SUPERMESH)

$R_1(i_2 - \cancel{i_1}) + R_3 i_2 + V_S + R_4 i_3 + R_2(i_3 - \cancel{i_1}) = 0$

$(R_1 + R_2) I_{S1} - V_S = (R_1 + R_3) i_2 + (R_2 + R_4) i_3$  Eq. 2

UNK  $i_2, i_3$

6.)  $V_{R2} = R_2(i_1 - i_3)$