

Signature

Name (print, please)

Student No.

**ECE 2300 Circuit Analysis
Summer 2009**

Quiz 3

DO NOT OPEN THIS QUIZ BOOKLET UNTIL INSTRUCTED TO DO SO

This quiz has 4 pages including this cover page. If you are missing any pages, raise your hand. You have 30 minutes to complete the quiz.

Notes

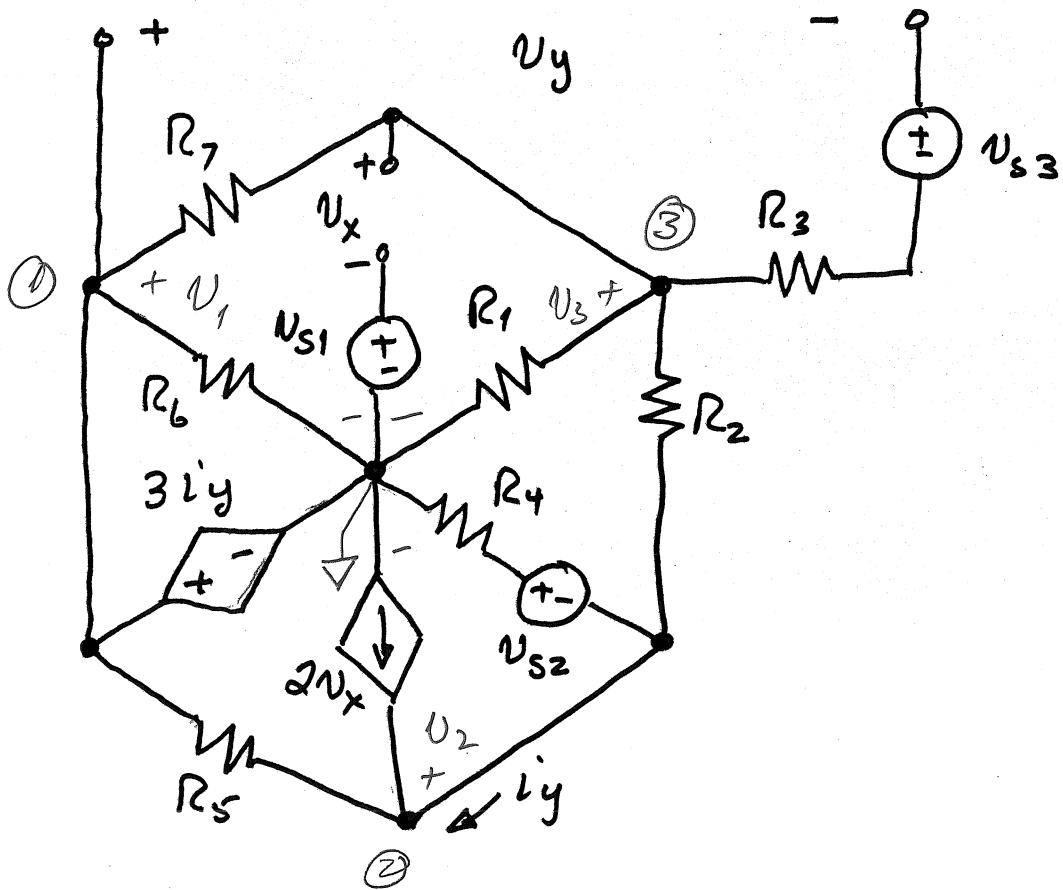
1. Be sure your name and signature appear above.
2. The quiz is closed-book. You may have a calculator and one 8 ½" x 11" crib sheet.
3. To receive full credit for a problem, you must:
 - Show all work necessary to solve the problem;
 - Define all variables and parameters and label them on circuit diagrams;
 - Use the proper notation for all variables.
 - Show all units explicitly in intermediate and final results;
 - Indicate clearly whether power being calculated is absorbed or delivered;

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For the circuit shown below, do the following.

i) Write a set of node voltage equations that could be used to solve the circuit. Credit will be deducted if more equations than necessary are written, or if fewer than necessary are written. Do not attempt to solve the equations or to simplify the circuit in any way.

ii) Write an expression for the voltage v_y in terms of only the node voltages and the circuit parameters (i.e., the given resistors and sources).



i) Choosing the center as the reference node, we then have 3 non-reference essential nodes, as labeled. The node voltage equations are...

Room for Extra Work

$$\textcircled{1} \quad v_1 = 3i_y$$

$$\textcircled{2} \quad \frac{v_2 - v_1}{R_5} - 2v_x + \frac{v_2 + v_{s2}}{R_4} + \frac{v_2 - v_3}{R_2} = 0$$

$$\textcircled{3} \quad \frac{v_3}{R_1} + \frac{v_3 - v_2}{R_2} + \frac{v_3 - v_1}{R_7} = 0$$

Auxiliary equations:

$$v_x: \quad v_x + v_{s1} - v_3 = 0$$

$$i_y: \quad i_y = -2v_x + \frac{v_2 - v_1}{R_5}$$

$$\text{ii) KVL:} \quad v_y + v_{s3} + v_3 - v_1 = 0$$