

## School of Engineering Department of Electrical and Computer Engineering

332:221

## Principles of Electrical Engineering I Quizlette 4

Fall 2012

USING A CALCULATOR WILL SLOW YOU DOWN! Final answers must appear in the appropriate box. Show your work outside the box.

1. Basic Stuff: Please answer the following questions about FIGURE 1.



Figure 1: Circuit diagram for problem 1

(a) (1 pt) R3 and R4 are in parallel: F
(b) (1 pt) R6 and R5 are in parallel: T
(c) (1 pt) Given V<sub>1</sub>, what is the voltage across resistor R<sub>8</sub>?

 $V_{R_7} = V_1 \frac{R_8}{R_2 + R_8}$ 

- (d) (1 pt) Given  $I_x$  what is the current through resistor  $R_6$ ?

$$I_{R_6} = I_1 \frac{R_5}{R_6 + R_5}$$

2. Getting Cute:



Figure 2: Circuit diagram for problem 2

(a) (3 *pts*) Write down the three governing equations using the node voltage method with voltages  $V_1$ ,  $V_2$  and  $V_3$  in FIGURE 2

node  $V_1$ :  $\frac{V_A - V_1}{R_1} = \frac{V_1}{R_2 + R_8} + \frac{V_1 - V_2}{R_3 + R_4}$   $\frac{V_1 - V_2}{R_3 + R_4} = (V_2 - V_3) \left(\frac{1}{R_5} + \frac{1}{R_6}\right)$ node  $V_2$ :  $(V_2 - V_3) \left(\frac{1}{R_5} + \frac{1}{R_6}\right) + I_C = \frac{V_3}{R_7}$ node  $V_3$ :

(b) (3 pts) FIGURE 2 has four meshes. Write down the THREE governing equations using the mesh current method (define all mesh currents running clockwise). **HINT:** one of the mesh currents must be  $-I_C$ .

$$V_A - i_1 R_1 - (i_1 - i_2)(R_2 + R_8) = 0$$

mesh  $i_1$ :

$$i_2(R_3 + R_4) + (i_2 - i_3)R_6 + (i_2 + I_C)R_7 + (i_2 - i_1)(R_8 + R_2) = 0$$

mesh  $i_2$ :

$$i_3 R_5 + (i_3 - i_2) R_6 = 0$$

mesh  $i_3$ :