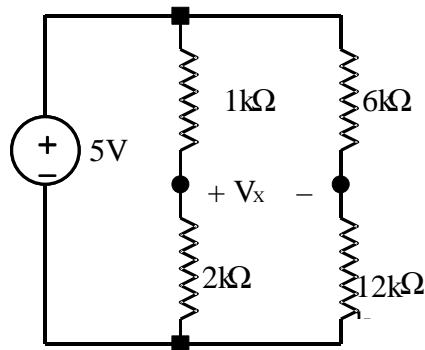Ben Wild   Summer 2002

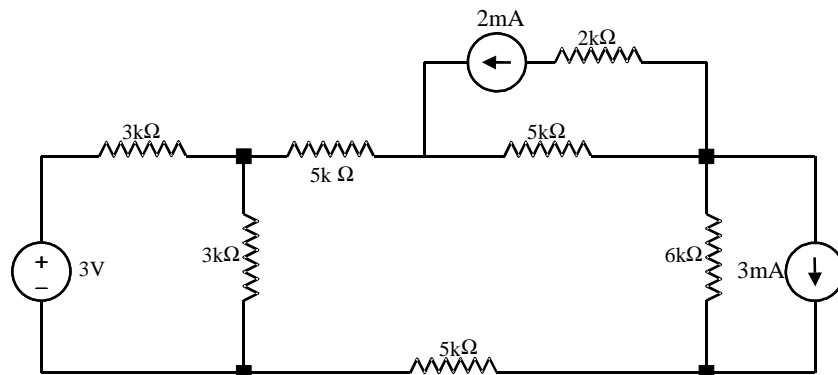## EE40 – **Problem Set #4**
## **Due: July 12**, 12pm

Problem 1 (short)

Find V_X.
(Hint: DO NOT use nodal analysis … that is too much work The only other tricks you know so far are series and parallel resistor formulas and voltage and current dividers.)

Problem 2 (medium)

(a) Identify a convenient place to put the ground node. Beware, if you select the wrong place to put the ground node, you will create a "floating voltage source."
(b) Label the unknown voltage nodes, excluding the ground node.
(c) Write nodal equations at each node. DO NOT simplify your equations.

Problem 3 (medium)
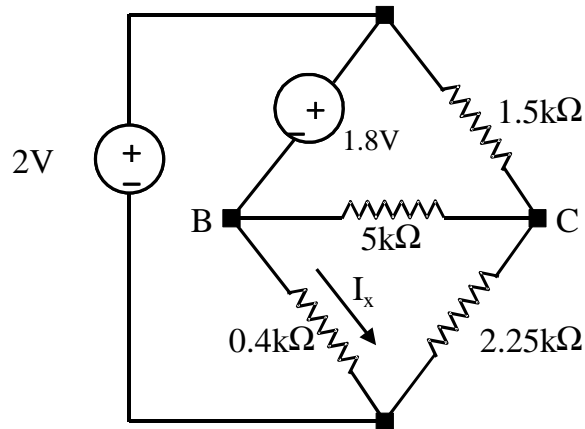
(a) Find I_x without performing Nodal Analysis. (EASY!)
(b) Define a reference node (to avoid floating voltage sources) and use nodal analysis to find the voltage difference V_C-V_B and the current from C to B through the 5K resistor.

Problem 4 (medium)
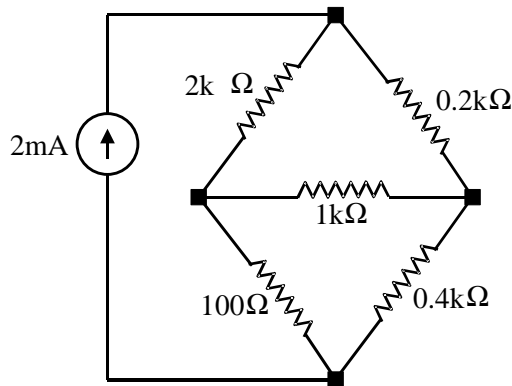
(a) Identify a convenient place to put the ground node.
(b) Label the unknown voltage nodes, excluding the ground node.
(c) Write nodal equations at each node. DO NOT simplify your equations.
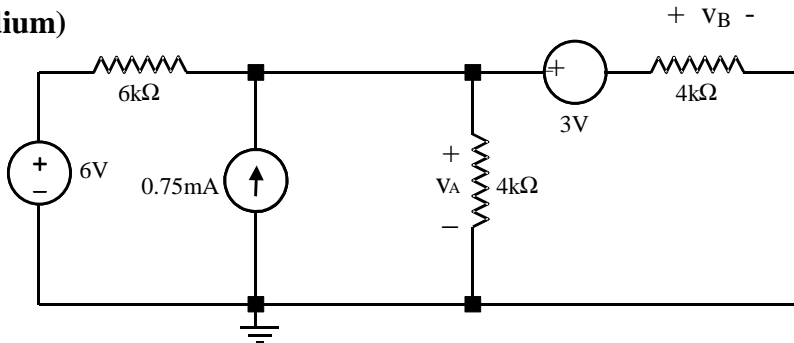
Problem 5 (short)
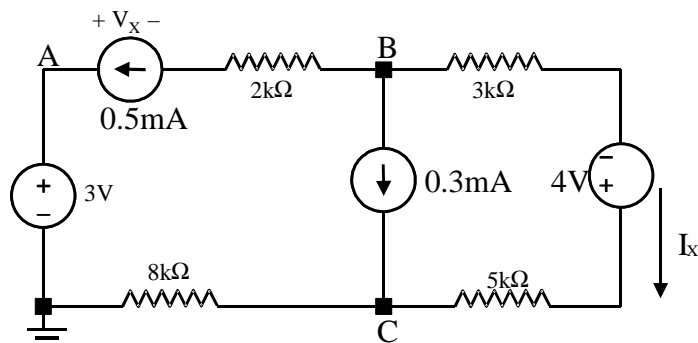
Look this circuit over very carefully before beginning. The effort depends quite a lot on how you proceed. (After that warning, only a fool would start writing nodal equations!) Hint: You

will apply KCL and KVL judiciously. And remember no current flows into or out of ground .. it is on the circuit diagram just to indicate the reference for potential.
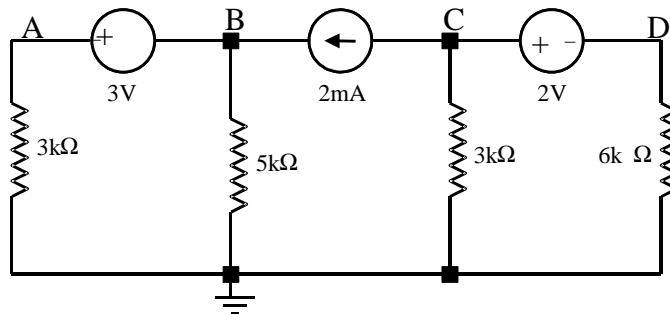
(a) Find V_C
(b) Find I_X
(c) Find V_B. (Warning: the voltage across a current source is rarely zero!)
(d) What is V_X?

Problem 6 (medium)

Use Nodal Analysis to find V_A and V_B. (Yes, numerical values please)

Problem 7 (short)

A, B, C, and D all have unknown node voltages. Use nodal analysis to find 4 equations sufficient to solve for V_A, V_B, V_C, and V_D. DO NOT solve your equations.

Problem 8 (medium) Review of Pulse Distortion

A 2V pulse of duration 10nsec drives one of the signal nodes at the output of your microprocessor. It drives this node, call it node X, through a resistance R_X. The capacitance of node X to ground is 1pF. Assume that the voltage at node X much reach a minimum of 1.2 V to be correctly interpreted as a logic 1.
(a) What is the maximum value of the resistance R_X?
(b) At this value of R_X what is V_X 10nsec after the input pulse is finished (that is 20nsec after the start of the pulse)?