Midterm 1
EE40
Spring 2012

NAME:_____

Instructions

Read all of the instructions and all of the questions before beginning the exam.

There are 4 problems in this exam. The total score is 100 points. Points are given next to each problem to help you allocate time. Do not spend all your time on one problem.

Unless otherwise noted on a particular problem, you must show your work in the space provided, on the back of the exam pages or in the extra pages provided at the back of the exam.

Draw a BOX or a CIRCLE around your answers to each problem.

Be sure to provide units where necessary.

GOOD LUCK!

PROBLEM	POINTS	MAX
1		12.5
2		35
3		27.5
4		25

Problem 1 *Warm-up*

a) Solve for v_{out}. (12.5 points)
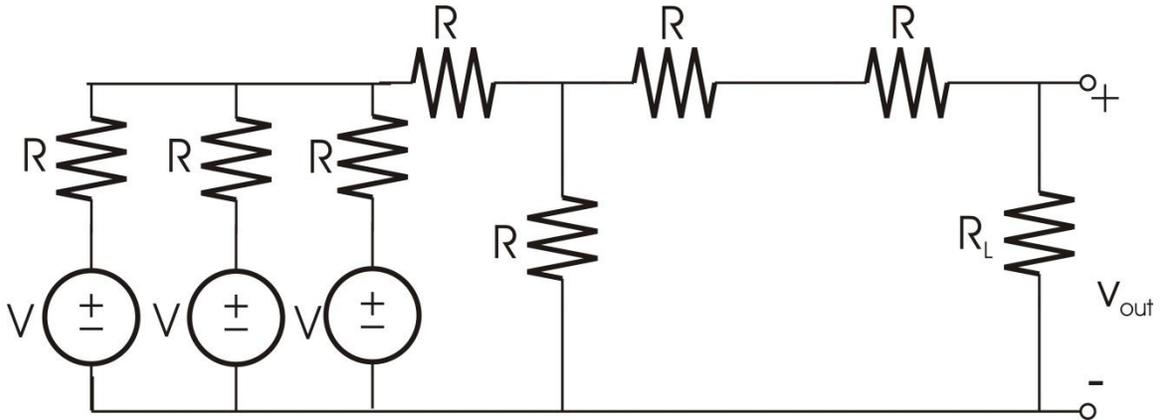
Solution:

"I took one course in existential philosophy at, uh, at New York University, and on, uh, on the final... they gave me ten questions, and, uh, I couldn't answer a single one of 'em. You know? I left 'em all blank... I got a hundred."
- Sandy Bates, Stardust Memories

Problem 2 *Nodal* (35 points)

Provide a solution to the circuit below USING NODAL analysis. Use the node numbers and labels provided.
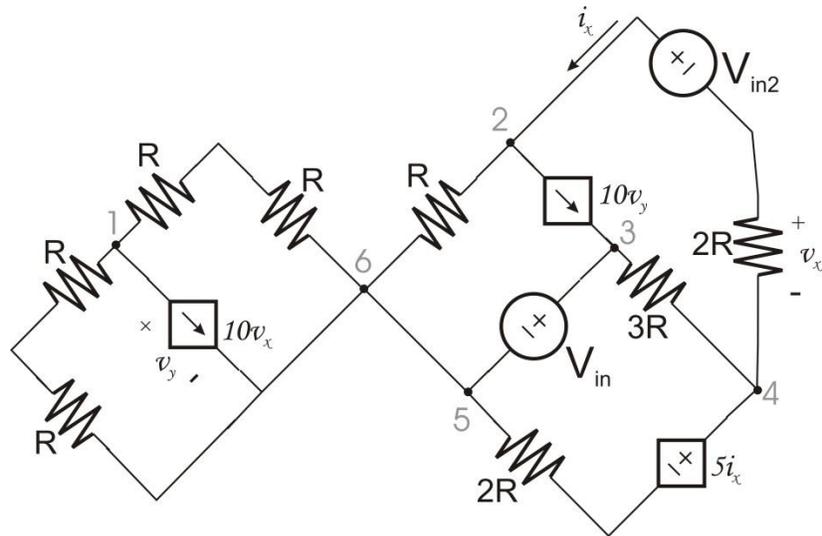
In the box below, provide your answer with equations in this form or lose points (v1 refers to the voltage at node 1, etc:

$$\underline{\quad} v1 + \underline{\quad} v2 + \quad \ldots \quad + \underline{\quad} vn = \underline{\quad}$$

...

Solution:

Brian: You have to be different!
The Crowd: Yes, we are all different!
Small lonely voice: I'm not!
-*Life of Brian (Monty Python)*

Problem 3 *Mesh* (27.5 points)

Provide a solution to the circuit below USING MESH analysis. Use the mesh variables and labels provided.
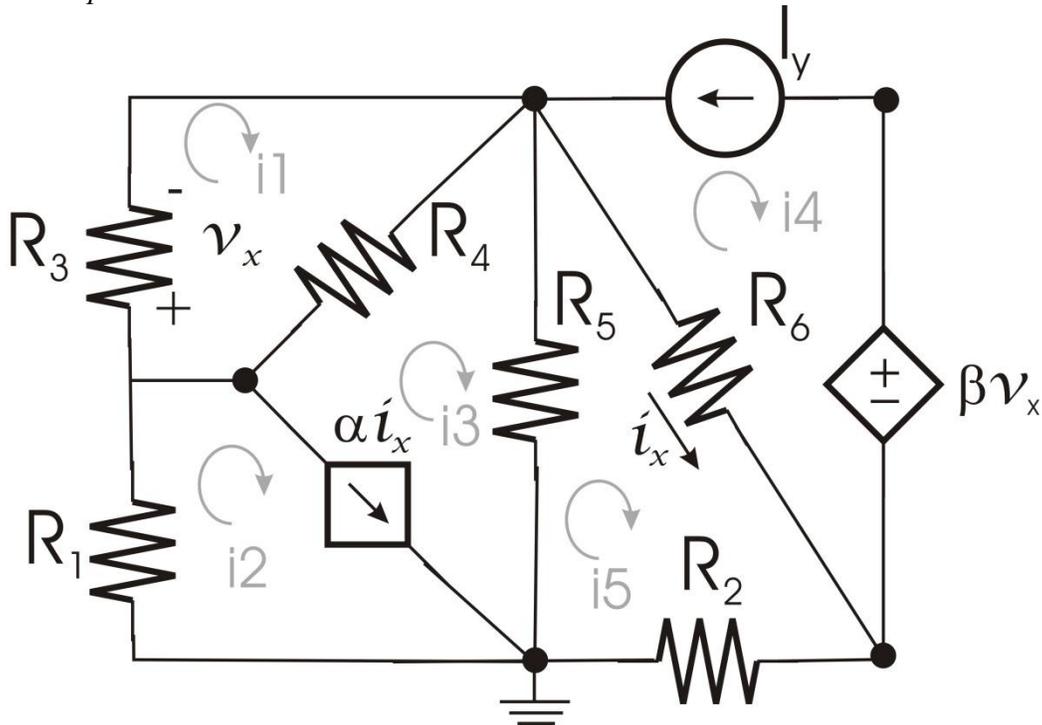
In the box below, provide your answer with equations in this form or lose points (i1 refers to mesh current 1, etc:

$$\underline{\qquad}\,\boldsymbol{i1} \quad + \quad \boldsymbol{...} \quad + \quad \underline{\qquad}\,\boldsymbol{in} \quad = \quad \underline{\qquad}$$

Solution:

Problem 4 *Equivalent circuits* (12.5 points)

a) Provide the simplest equivalent circuit for the grey box (measured from terminals a and b).
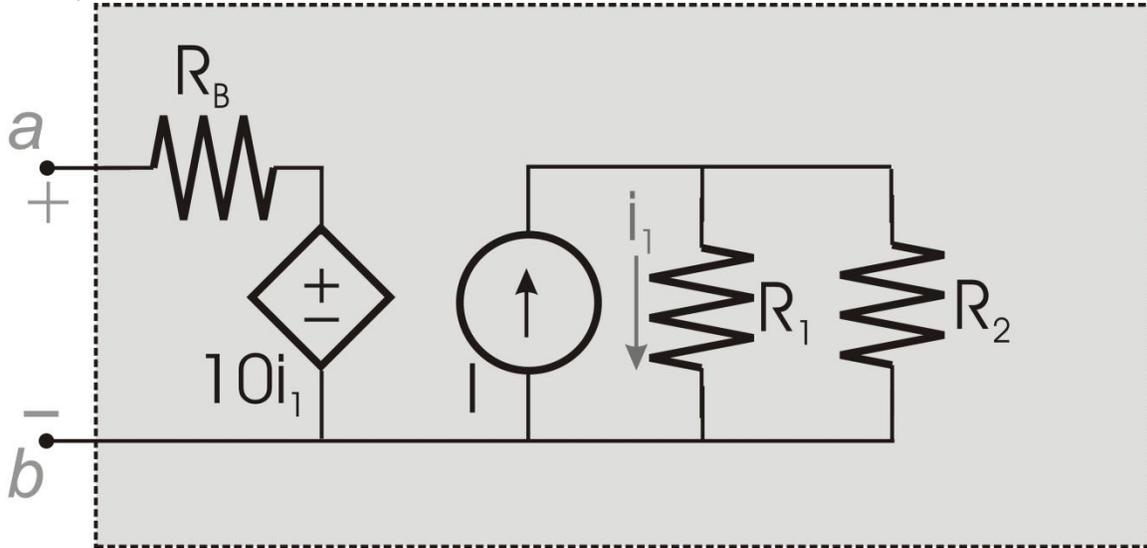
Solution:

b) Provide the simplest equivalent circuit for the grey box (measured from terminals a and b). (12.5 points)

Solution: