

King Fahd University



of Petroleum & Minerals

**Electrical Engineering Department  
EE 201 Electric Circuits I  
Third Semester (103)**

**Exam II  
Tuesday, 9 August 2011  
9:00 pm – 10:30 pm**

**Name:** \_\_\_\_\_

**ID:** \_\_\_\_\_

**Section:** \_\_\_\_\_

| <b>Problem</b> | <b>Score</b> | <b>Out of</b> |
|----------------|--------------|---------------|
| <b>1</b>       |              | <b>17</b>     |
| <b>2</b>       |              | <b>20</b>     |
| <b>3</b>       |              | <b>20</b>     |
| <b>4</b>       |              | <b>18</b>     |
| <b>Total</b>   |              | <b>75</b>     |

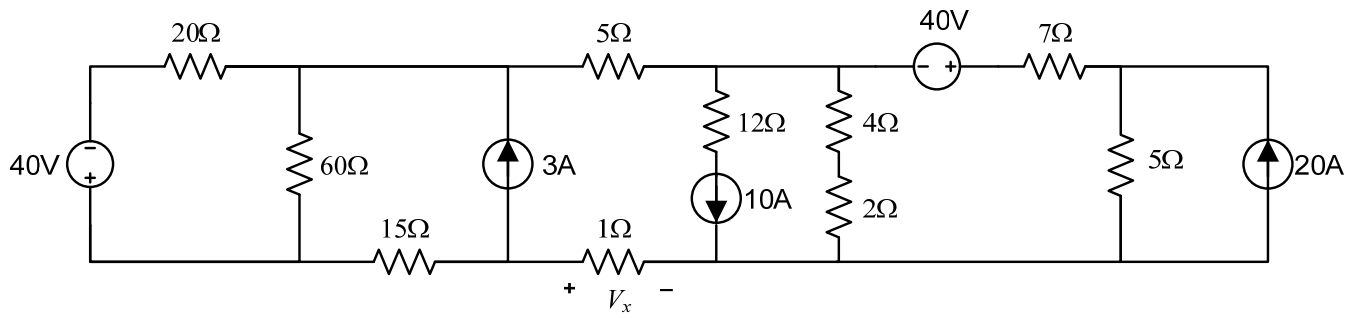
**Clearly present your work and show, on the circuit drawing, all the variables used in the calculation.**

**When applicable, make sure to use the specified method to solve the question(s).**

**Good Luck**

**Problem 1**

Consider the circuit below. Use source transformation to find the voltage  $V_x$ .  
(IMPORTANT: Show all intermediate steps)

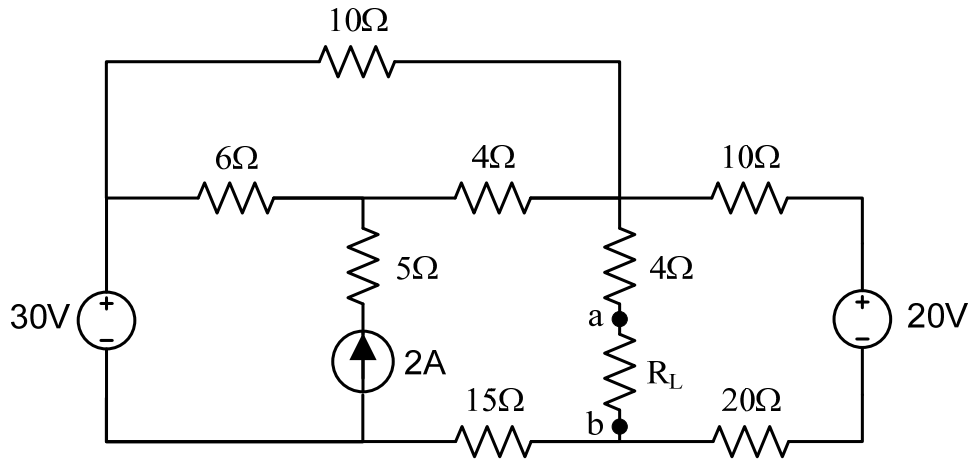




## Problem 2

Consider the circuit below.

1. Find the Thevenin equivalent circuit between the terminals  $a$  and  $b$  using superposition technique for  $V_{Th}$  and deactivation technique for  $R_{TH}$ .
2. Find the value of  $R_L$  that will absorb the maximum power from the remainder of the circuit. What is the value of this maximum power?





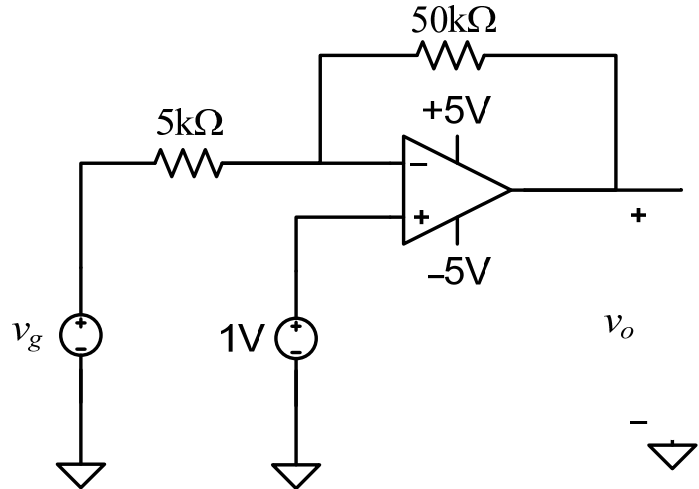
### Problem 3

Consider the circuit below. The op amp is ideal.

1. Find the values of the output voltage ( $v_o$ ) for  $v_g = +1.5$  V and  $v_g = -1.5$  V.
2. What is the voltage gain of this amplifier?
3. We would like to make this amplifier saturate at  $v_g = +0.5$  V and  $v_g = -0.5$  V.

Which component (only one) to change and what will be its new value. You should not modify the opamp nor change the type of the circuit components.

Justify your answer.





#### Problem 4

Consider the circuit below, the switch was closed for a long time and was opened at  $t_0 = 10\text{ms}$ .  $v_c(t)$  is the voltage across the  $1\mu\text{F}$  capacitor.

1. Calculate the voltage  $v_c(t)$  for  $t \geq 10\text{ms}$ .
2. Calculate the current  $i(t)$  for  $t \geq 10\text{ms}$ .

