

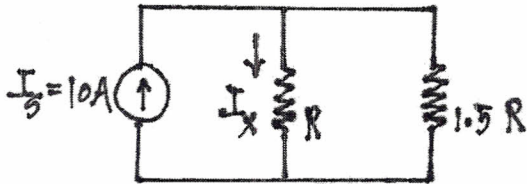
EE101 Midterm Examination 1

October 19, 2012

NAME \_\_\_\_\_ STUDENT ID \_\_\_\_\_

Please put boxes around your answers. Show all work on the sheets provided and if necessary you can use back pages, but indicate which problem your work applies to. Answer to two sub-decimal places (example, 10.33 rather than 10.326). You are not allowed to use any canned programs. Please honor the rules of academic integrity.

1.(10points) Points) Shown below is a current divider circuit.

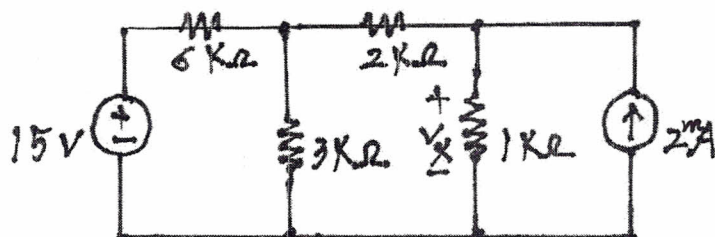


(a). (5 points) what is the equivalent resistance seen by the current source  $I_s$ ?

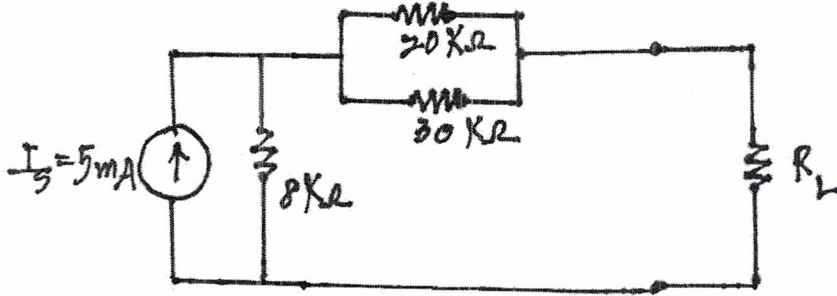
(b). (5 points) How much current flows through  $R$ , or what is  $I_x$ ?

2.(20 points) Find the voltage  $V_x$  across the  $1\text{K}\Omega$  resistor.

(Hint: superposition method may be helpful.)



3.(20 Points)The following circuit shows that the load resistor  $R_L$  is connected to a current source through some resistors.



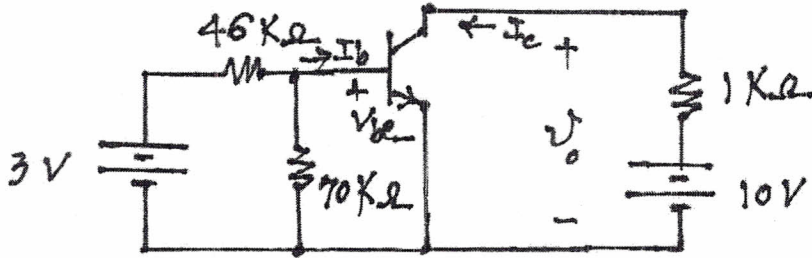
(a)(10 points) Find the value of  $R_L$  such that the power delivered to the load is maximized.

(b)(10 points) What is the maximum power delivered to the load  $R_L$ ?

4.(25 point) Find the output voltage  $V_o$  in the circuit below.

Assume that  $V_{be}=0.7V$  and  $\beta=100$ .

(Hint: Find  $I_b$  first and then  $I_c$  using the relationship  $I_c = \beta I_b$ .)



5.(25 points) Shown below is an Op Amp circuit powered by two input sources. The Op Amp is non-ideal with a finite input resistance of  $R_i=1\text{ K}\Omega$  and a rather small voltage gain of  $A=100$ , with its output resistance  $R_o=100\ \Omega$ . What is the output voltage  $V_o$ ?

