

**ECE 301**  
**Fall Semester, 2006**  
**HW Set #12**

Due: November 30, 2006  
 wlg

Name \_\_\_\_\_  
 Print(last, first)

circle:    2:10 section            3:40 section

Use Engineering Paper. Work only on one side of the paper. Use this sheet as your cover sheet, placed on top of your work and stapled in the top left-hand corner. Number the problems at the top of the page, in the center of the sheet. **Do neat work. Underline your answers. Show how you got your equations. Be sure to show how you got your answers.** Each problem counts 15 points.

- (1) You are given the configuration shown in Figure 1(a). The input voltage is 2 volts. You want to design an op amp circuit so that the output voltage is 10 volts. There are two purposed circuit layouts that you are to use. These are described in Figures 1(b) and 1(c). Your assignment here is to complete the task.

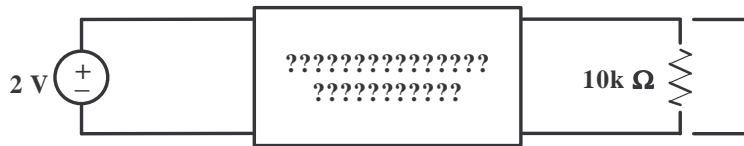


Figure 1(a): Basic layout for problem 1.

- (a) Use the following configuration to achieve the requirements stated above. Give your values of  $R_1$ ,  $R_2$ ,  $R_3$ , and  $R_4$ . Give the development of your work that leads to your final answer.

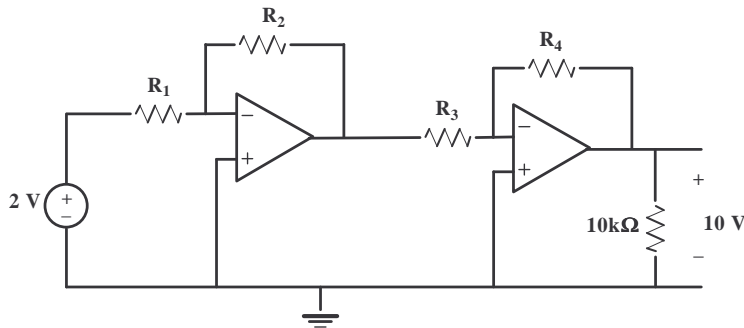


Figure 1(b): Purposed circuit for satisfying design specs.

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- (b) Use the following configuration to achieve the requirements stated above. Give your values of  $R_1$  and  $R_2$ . Again, show the development of your work that leads to your final answer.

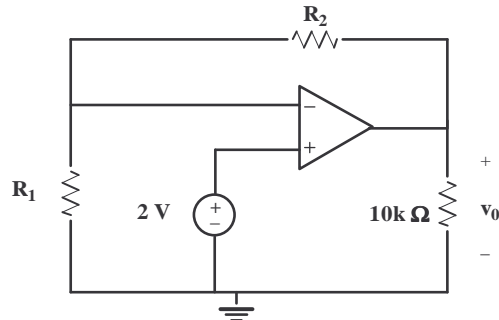


Figure 1(c): Purposed circuit for satisfying design specs.

- (2) Find  $i_o$  in the op amp circuit of Figure 2. Ans:  $i_o = 0.12 \text{ mA}$ .

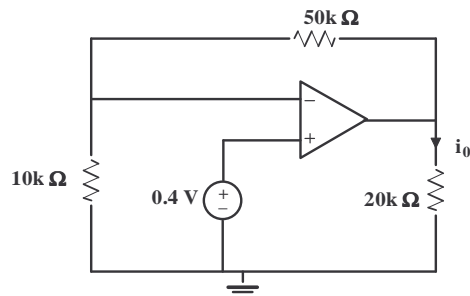


Figure 2: Circuit for problem 2.

- (3) You are given the op amp circuit of Figure 3. Find  $v_o/v_{in}$ . Ans:  $R_2/R_1$

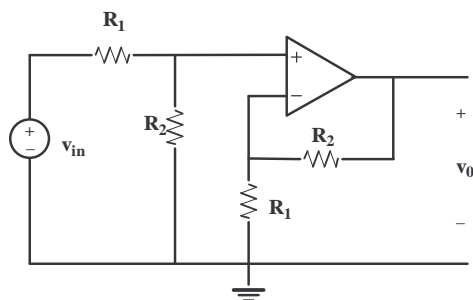


Figure 3: Circuit for problem 3.

(4) For the op amp configuration of Figure 4, find  $v_0/v_{in}$ . Ans:  $-R_{FB}/R_A$

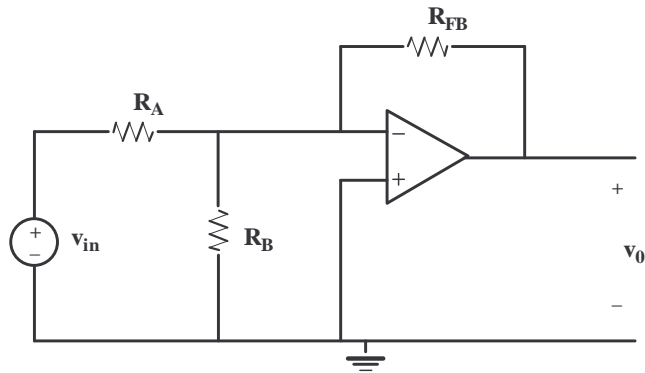


Figure 4: Circuit for problem 4.

(5) Find the output voltage  $v_0$  in terms of the input voltage  $v_{in}$  for the op amp circuit of Figure 5.  
Ans:  $v_0 = -6v_{in}$

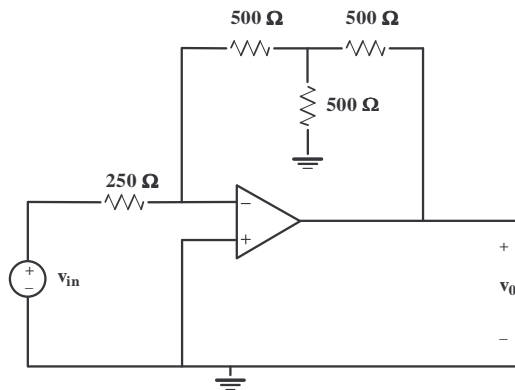


Figure 5: Circuit for problem 5.

(6) You are given the op amp circuit of Figure 6. Show that  $v_0 = -(2/3)v_S$ .

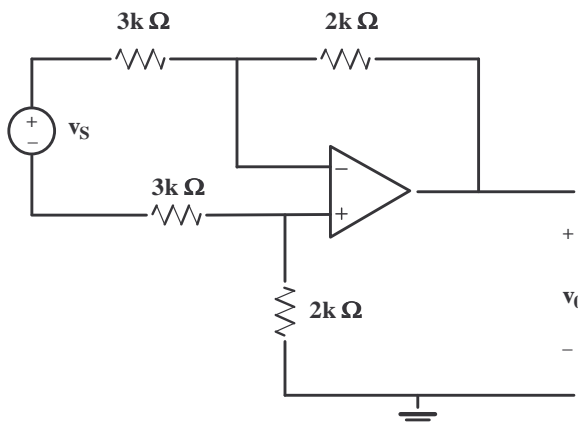


Figure 6: Circuit for problem 6.

