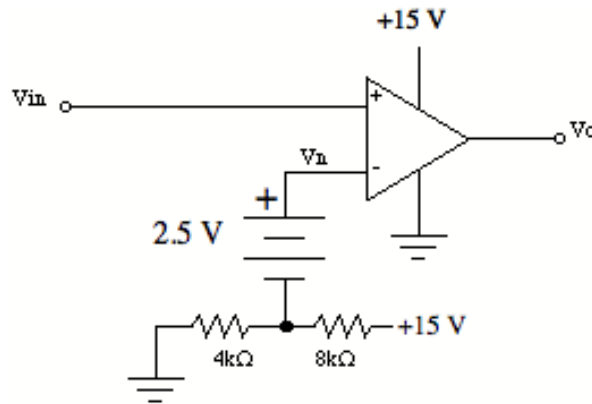


CASE WESTERN RESERVE UNIVERSITY
 Case School of Engineering
 Department of Electrical Engineering and Computer Science
ENGR 210. Introduction to Circuits and Instruments (4)

Quiz No. 8

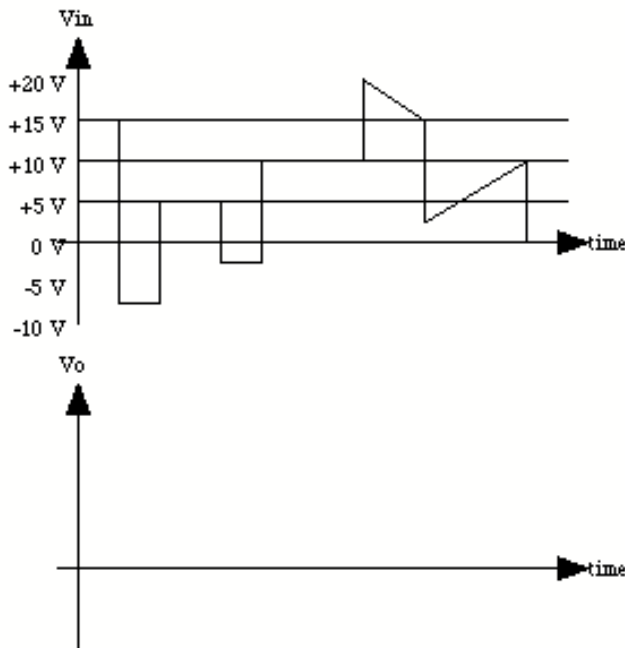
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PUT ANSWERS IN THE SPACE PROVIDED AND, IF APPROPRIATE, SHOW YOUR WORK. BE SURE TO STATE ANY ASSUMPTIONS

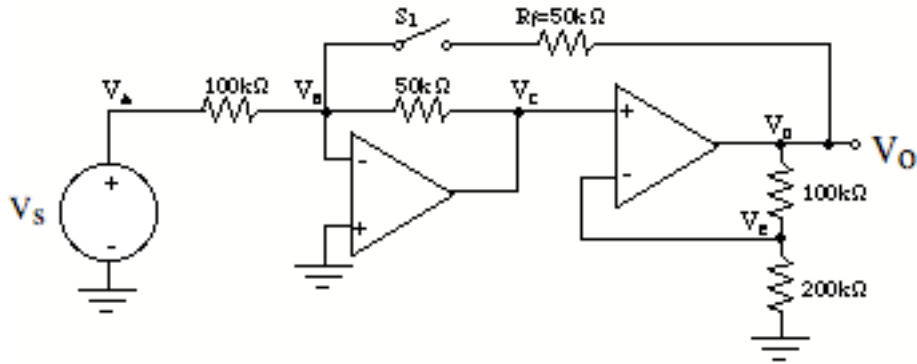


Problem 1 Comparators (10 points)

- (a) For the given component values what is V_n ? _____
- (b) What is the range of possible output voltages V_o ?
- (c) Suppose V_{in} is the waveform below. Sketch the corresponding values of V_o for this circuit. Be sure to label the values of the output voltages.



Problem 2 Circuits with Multiple Op-Amps (10 points)



(a) Assume that switch S_1 associated with R_f is open, i.e., the resistor is not connected in the circuit. Draw a block diagram of the above circuit showing the function of each OP AMP.

(b) What is the gain of each block in your answer of (a)?

(c) Assume that switch S_1 is now closed, connecting V_o through R_f to the input of the first operational amplifier.

(i) What is the voltage V_B at this node? _____

(ii) Write KCL for this node. Please write your answer in terms of V_s and V_o only. You do not have to solve this equation — only set it up.