EE271 Quiz 5 Spring 2013 Name_____

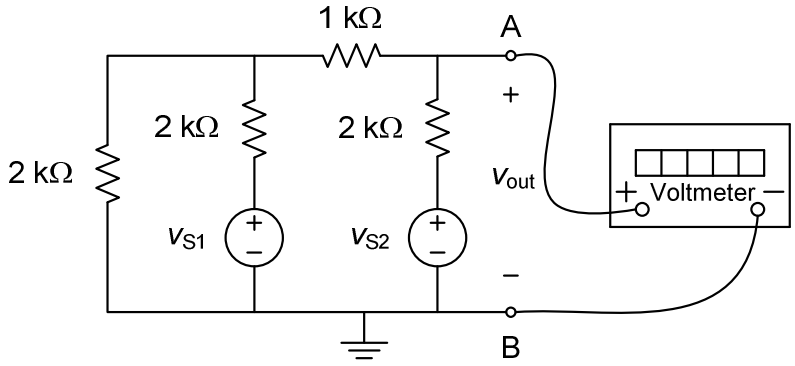
You are allowed to use your lab manual and lab notebook during the quiz.

(1) (30 points) Fill in the blanks in Table 1 (show your work!):

Decimal number	Binary number
33 →	
	← 1011
111 →	
	← 101101

Table 1. Decimal↔Binary conversion table

(2) (30 points) For the circuit shown, find the general mathematical expression for the voltage v_{out} that will be measured by the voltmeter in terms of source voltages v_{S1} and v_{S2}. Show your work step by step.



More questions on the back!

(3) (20 points) Using the expression found in Problem (2), find the voltmeter reading expected for each one of the following four cases:
(a) $v_{S1}=v_{S2}=0$.
(b) $v_{S1}=0$ V and $v_{S2}=4$.
(c) $v_{S1}=4$ and $v_{S2}=0$ V.
(d) $v_{S1}=v_{S2}=4$ V.

(4) (20 points) Based on the results of Problem (3), state one application where this circuit could be used. (Hint: Interpret 4 V as logic HIGH state (binary 1), 0 V as logic LOW state (binary 0) and pretend as if the values of v_{s1} and v_{s2} voltages side-by-side as $v_{S2}v_{S1}$ represent a two-digit binary input signal applied to the circuit, as shown in Table 2.)

Table 2. Binary number $v_{S2}v_{S1}$

v_{S2} (V)	v_{S1} (V)	Binary number $v_{S2}v_{S1}$
0	0	00
0	4	01
4	0	10
4	4	11