HOMEWORK 1. TRANSISTORS AND GATES (4/4 points)

Fill in the truth table for the AND and OR of three inputs x, y, and z. **You have only ONE submission.**

x y z	x AND y AND z		x OR y OR z	
0 0 0	0	**Answer:** 0	0	**Answer:** 0
0 0 1	0	**Answer:** 0	1	**Answer:** 1
0 1 0	0	**Answer:** 0	1	**Answer:** 1
0 1 1	0	**Answer:** 0	1	**Answer:** 1
1 0 0	0	**Answer:** 0	1	**Answer:** 1
1 0 1	0	**Answer:** 0	1	**Answer:** 1
1 1 0	0	**Answer:** 0	1	**Answer:** 1
1 1 1	1	**Answer:** 1	1	**Answer:** 1

SOLUTION OR EXPLANATION HEADING

An AND has an output of 1 when all inputs are 1 and 0 otherwise. An OR has an output of 0 when all inputs are 0 and 1 otherwise.

Hide Answer *You have used 1 of 1 submissions*

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HOMEWORK 2. TRANSISTORS AND GATES

Consider the following CMOS circuit.

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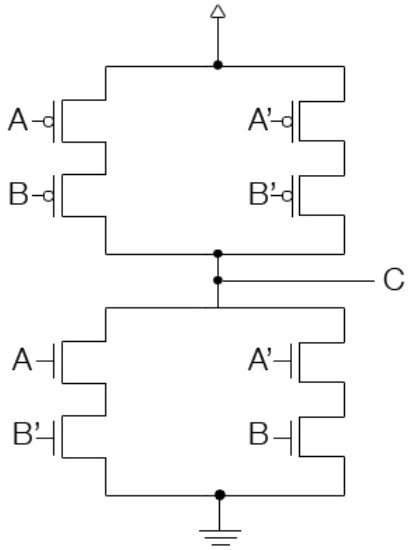

HOMEWORK 2 A. TRANSISTORS AND GATES (1/1 point)

Fill in the truth table values for C. **You have only ONE submission.**

A	B	C	
0	0	1	**Answer:** 1
0	1	0	**Answer:** 0
1	0	0	**Answer:** 0
1	1	1	**Answer:** 1

SOLUTION OR EXPLANATION HEADING

Whenever A and B have the same value (both 0 or both 1), then one of the top connections to the supply voltage is made, and both bottom connections to ground are broken, which forces the output to 1. The opposite is true when A and B differ.

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HOMEWORK 2 B. TRANSISTORS AND GATES (1/1 point)

Which of the following describe the function of this circuit? [Check all that apply]

- [x] C = 1 if A = B ✔
- [x] C = 0 if A ≠ B ✔
- [ ] C = NOT A AND NOT B
- [x] C = (NOT A AND NOT B) OR (A AND B) ✔

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EXPLANATION

The first two are true by inspection of the truth table.

The third is not true since if A = B = 1, then C = 0 by this equation, whereas C = 1 in the truth table.

If A = B, then either (NOT A AND NOT B) = 1, or (A AND B) = 1, and since these two terms are OR'd together, then C = 1. So just as in the truth table, C = 1 if A = B.

Final Check | **Save** | **Hide Answer** *You have used 1 of 2 submissions*

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HOMEWORK 3. TRANSISTORS AND GATES (1/1 point)

By combining multiple smaller gates, we can create a wider gate. Which of the following circuits perform the function w AND x AND y AND z? [check all that apply]

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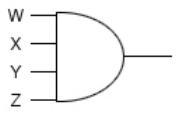

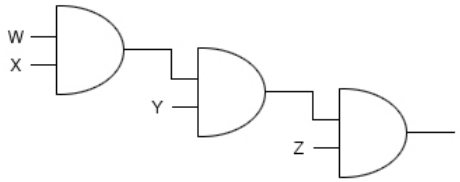

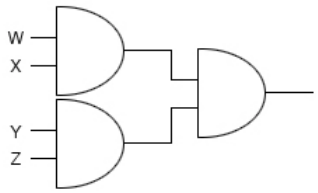

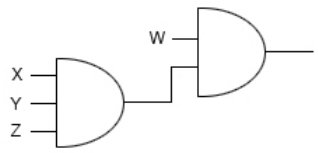

EXPLANATION

All the circuits perform the AND of all four inputs (W, X, Y, Z).

The first circuit is, by definition, a 4-input AND.

The second circuit is (((W AND X) AND Y) AND Z), which is equivalent to W AND X AND Y AND Z.

The third circuit is ((W AND X) AND (Y AND Z)), which is equivalent to W AND X AND Y AND Z.

The fourth circuit is ((X AND Y AND Z) AND W), which is equivalent to W AND X AND Y AND Z.

Final Check | **Save** | Hide Answer *You have used 1 of 2 submissions*

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