Remember in the physical world, we usually use NAND Gates which are just inverted AND gates.
One of the homework problem implemented an OR gate using only NAND gates.

The simplest example is a two-input (X & Y) expression with an output:

X	Y	Output
0	0	0
0	1	1
1	0	0
1	1	0

or maybe something like

X	Y	Output
0	0	1
0	1	0
1	0	1
1	1	0

or even

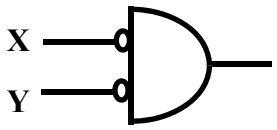
X	Y	Output
0	0	1
0	1	0
1	0	1
1	1	1

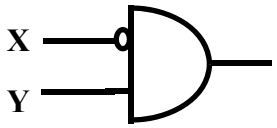
See page 2, for examples of AND gate configurations when only one of the Outputs is True, i.e. = 1.

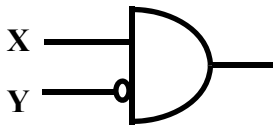
In class on Wednesday, we discussed the case where are four Outputs = 1.
The solution was said to be battery voltage, often designated as Vcc.
And for the case, when all Outputs = 0, the solution is GND.

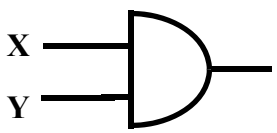
For the cases, when two of the Outputs = 1, some of the cases are simply an AND gate;
others require two AND gates and an OR gate. See page 3 & 4.

For the case with three Outputs = 1, consider the situation for the single Output = 0.
Here we can use NOT AND, i.e., a NAND gate for the single Output = 0. See page 5.

Input X Y	Output	Expression	Gates
0 0	1	$\overline{X} \bullet \overline{Y}$	
0 1	0		
1 0	0		
1 1	0		

Input X Y	Output	Expression	Gates
0 0	0		
0 1	1	$\overline{X} \bullet Y$	
1 0	0		
1 1	0		

Input X Y	Output	Expression	Gates
0 0	0		
0 1	0		
1 0	1	$X \bullet \overline{Y}$	
1 1	0		

Input X Y	Output	Expression	Gates
0 0	0		
0 1	0		
1 0	0		
1 1	1	$X \bullet Y$	

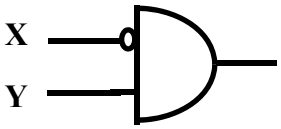
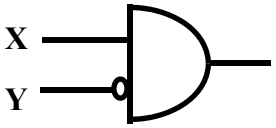
Input X Y	Output	Expression	Gates
0 0	1	$\overline{X} \bullet \overline{Y}$	See Below
0 1	1	$\overline{X} \bullet Y$	See Below
1 0	0		
1 1	0		

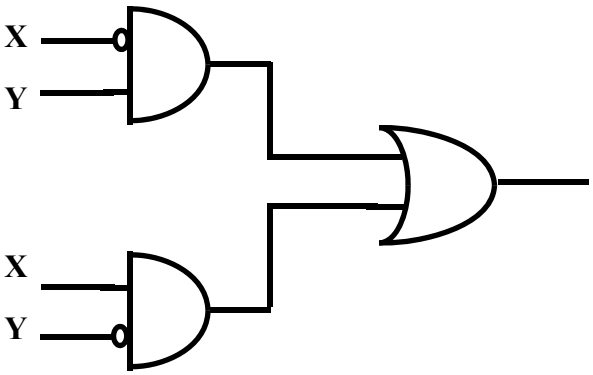
$$(\overline{X} \bullet \overline{Y}) + (\overline{X} \bullet Y) = \overline{X} \bullet (\overline{Y} + Y) = \overline{X} \bullet (1) = \overline{X}$$

Input X Y	Output	Expression	Gates
0 0	0		
0 1	1	$\overline{X} \bullet Y$	See Below
1 0	0		
1 1	1	$X \bullet Y$	See Below

$$(\overline{X} \bullet Y) + (X \bullet Y) = Y \bullet (\overline{X} + X) = Y \bullet (1) = Y$$

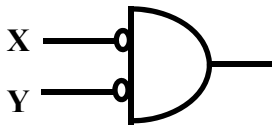
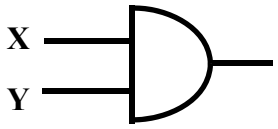
A few examples of realizing Boolean Outputs (2 True) using AND and OR Gates (with bubbles as needed).

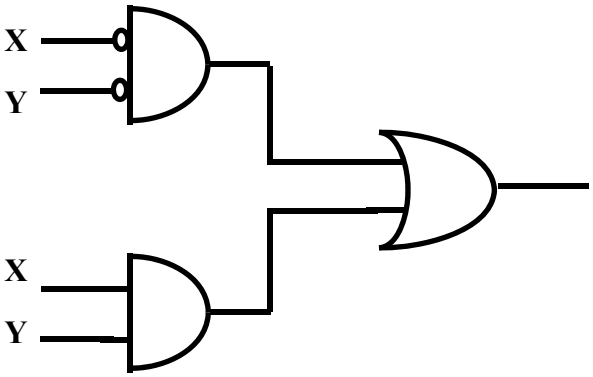
Input X Y	Output	Expression	Gates
0 0	0		
0 1	1	$\overline{X} \bullet Y$	
1 0	1	$X \bullet \overline{Y}$	
1 1	0		



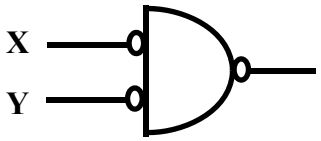
$$(\overline{X} \bullet Y) + (X \bullet \overline{Y})$$

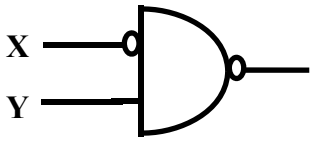
A few examples of realizing Boolean Outputs (2 True) using AND and OR Gates (with bubbles as needed).

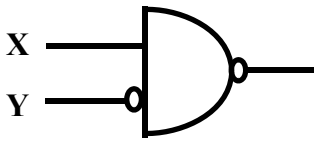
Input **X Y**	Output	Expression	Gates
0 0	1	$\overline{X} \bullet \overline{Y}$	
0 1	0		
1 0	0		
1 1	1	$X \bullet Y$	



$$(\overline{X} \bullet \overline{Y}) + (X \bullet Y)$$

Input **X Y**	Output	Expression	Gates
0 0	0	$\overline{\overline{X} \bullet \overline{Y}}$	
0 1	1		
1 0	1		
1 1	1		

Input **X Y**	Output	Expression	Gates
0 0	1		
0 1	0	$\overline{\overline{X} \bullet Y}$	
1 0	1		
1 1	1		

Input **X Y**	Output	Expression	Gates
0 0	1		
0 1	1		
1 0	0	$\overline{X \bullet \overline{Y}}$	
1 1	1		

Input **X Y**	Output	Expression	Gates
0 0	1		
0 1	1		
1 0	1		
1 1	0	$\overline{X \bullet Y}$