Lab #19 Name: ____________________________ Per: _____

Title: HALF & FULL ADDERS

Materials:

[1] 7400 2-input NAND gate IC
[1] 7486 2-input XOR gate IC
[1] 7408 2-input AND gate IC

Procedure:

1. **Draw** a logic symbol of the half adder illustrated in Fig. 19-a. Use XOR and AND gates.
2. Insert the 7408 & 7486 ICs into the breadboard and wire the circuit you drew in step 1.
3. Operate and record the results in Table 19-a.
4. **Draw** a logic symbol of the full adder illustrated in Fig. 19-b. Use XOR and NAND gates only.
5. Wire the full adder you drew in step 4. Use three input switches for C_{in}, A, and B.
6. Operate and record the results in Table 19-b.

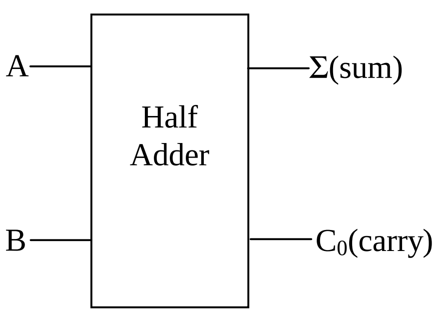

Fig. 19-a

Inputs		Outputs	
A	B	Σ	C_0
0	0		
0	1		
1	0		
1	1		

Table 19-a

Questions (answer on a separate piece of paper – **"Draw" means you must use a template**):

1. Where can the half adder be used?
2. Where can the full adder be used?
3. Why is the C_0 output needed on a half adder?
4. Why is the "extra" C_{in} input needed on a full adder?
5. **Draw** a logic symbol diagram of a full adder using AND, OR, and XOR gates.

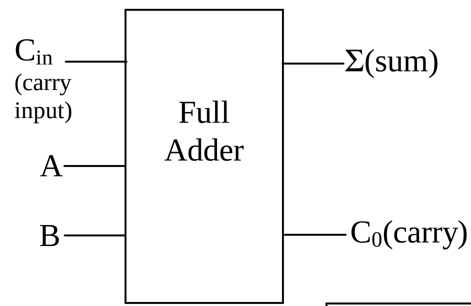

Fig. 19-b

Inputs			Outputs	
C_{in}	A	B	Σ	C_0
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

Table 19-b