(5 pts) Exercise B-11

- **Show the sum of products for the following truth table.**

A	B	C	f
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	0

(5 pts) Exercise B-12

- **Simplify the following equations (use Boolean laws discussed earlier)**

$B(A+0) =$

$B(A\overline{A}) =$

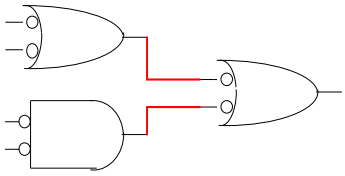
$(A+\overline{B})(\overline{A}+B) =$

$\overline{(A+B)} \bullet (A+B+C) =$

Is $\overline{A}\,\overline{B}$ the same as $\overline{AB}$ **?**

(5 pts) Exercise B-13

- **Use bubble pushing to simplify this circuit**



(10 pts) Exercise B-14

- **A) Show the sum of products for the following truth table.**

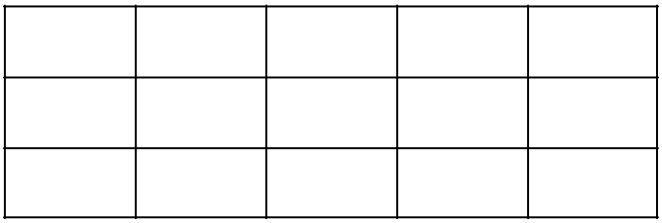
A	B	C	f
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

- **B) Simplify this equation**

(5 pts) Exercise B-21

- **1. Fill in the following K-Map based on the truth table at right**
- **2. Minimize the function using the K-map**

A	B	C	f
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0



(5 pts) Exercise B-22

- **Draw the two-level circuit for the function from Exercise B-21**

(5 pts) Exercise B-23

- **Suppose we already have this k-Map. Minimize the function.**

	$\overline{C}\,\overline{D}$	$\overline{C}D$	CD	$C\overline{D}$
$\overline{A}\,\overline{B}$	1	0	0	1
$\overline{A}B$	1	1	1	1
AB	1	1	0	0
$A\overline{B}$	0	0	0	1

(3 pts) Exercise B-24

- **Consider your answer to Exercise B-23. Using a K-map, you found some particular two-level, minimal circuit. However, is it unique? (e.g. is there only one possible two-level circuit for that k-Map that is minimal?) Will this always be the case, or could a different K-map change your answer?**

(5 pts) Exercise B-31

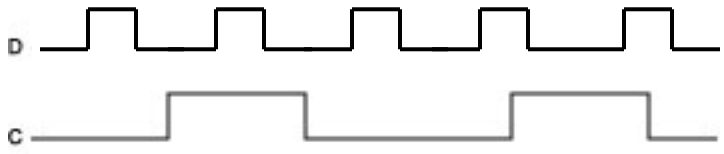
- **A. A 8-way mux has _____ "inputs" , _____ selector bit(s), and _____ output(s)**

(5 pts) Exercise B-32

- **Draw an 8-input mux with inputs: A, B, C, D, E, F, G, H and output: OUT (Remember to draw the selector bits)**

(you don't need to draw the internals, just the external view)

(5 pts) Exercise B-41 – Complete the timing diagram below



Q-FlipFlop
(**falling** edge
triggered)

Q-FlipFlop
(**rising** edge
triggered)

(5 pts) Exercise B-51

- **Draw a state diagram for the following next state function:**
- **How would you describe what input 'A' is accomplishing?**

A	Q_t	Q_{t+1}
0	0	0
0	1	1
1	0	1
1	1	1

(10 pts) Exercise B-52

- **John and Mary agree to play rock-paper-scissors to decide who has to pay for dinner. The overall winner will be whoever wins two rounds in a row.**
- **Assume you have 6 inputs:**
  - **JR, JP, JS (only one true depending on if John plays rock, paper, or scissors)**
  - **MR, MP, MS**
- **At each round,**
  1. **If John and Mary play the same (both scissors, etc.), then the game returns to the initial state.**
  2. **If either John or Mary has just won twice in a row, the next state should be a "Game over" state.**
  3. **Otherwise, the next state should reflect who won the most recent round**

Your task:

1. **How many different states do you need?**
2. **Draw the next state diagram for this game**

Of course:

Rock beats scissors
Paper beats rock
Scissors beats paper

(10 pts) Exercise B-53

- **How you could you make the rock/papers/scissors machine function on just 4 inputs? Draw the next state table for this version of the game. Do you have any don't cares?**