ECE 370: Digital Systems-Logic Design

Sample Test: Chapter 2
Spring 2005

1. Is the following equality valid? Determine using Boolean algebra and check yourself using a truth table.

$$\bar{A}\bar{C} + BC + A\bar{B} = \bar{A}B + AC + \bar{B}\bar{C}$$

2. What is the simplest sum-of-products expression for the following function? (*Hint: Use the consensus theorem* $AB + BC + AC = AB + AC$)

$$f(A,B,C,D) = B\bar{C}D + ACD + A\bar{B}D$$

3. What is the most simplified minimum-cost POS for the following function?

$$f(A,B,C,D) = \sum m(0,2,4,5,6,7,8,10,12,14,15)$$

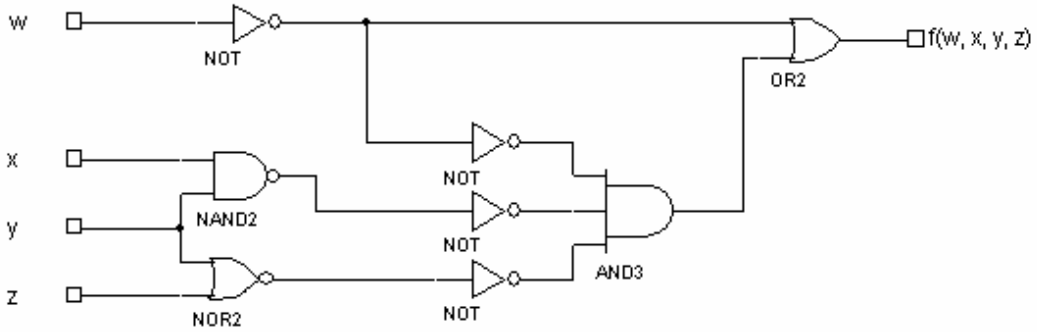
4. A circuit that controls a given digital system has three inputs: *X*, Y, and Z. It has to recognize three different conditions:

- Condition *A* is true if Z is true and either X is true or Y is false
- Condition *B* is true if *X* is true and either Y or Z is false
- Condition *C* is true if *Y* is true and either X is true or Z is false

The control circuit must produce a logic HIGH output if at least two of the conditions *A*, *B*, and *C* are true. What is the simplest circuit that can be designed for this purpose?

5. Given the following digital logic network, answer the following questions:

a) What is the un-simplified Boolean function for $f(w,x,y,z)$?
b) What is complete truth table that describes $f(w,x,y,z)$?
c) What given the following waveforms for *w*, *x*, *y*, and *z*, what is the waveform for $f(w,x,y,z)$,



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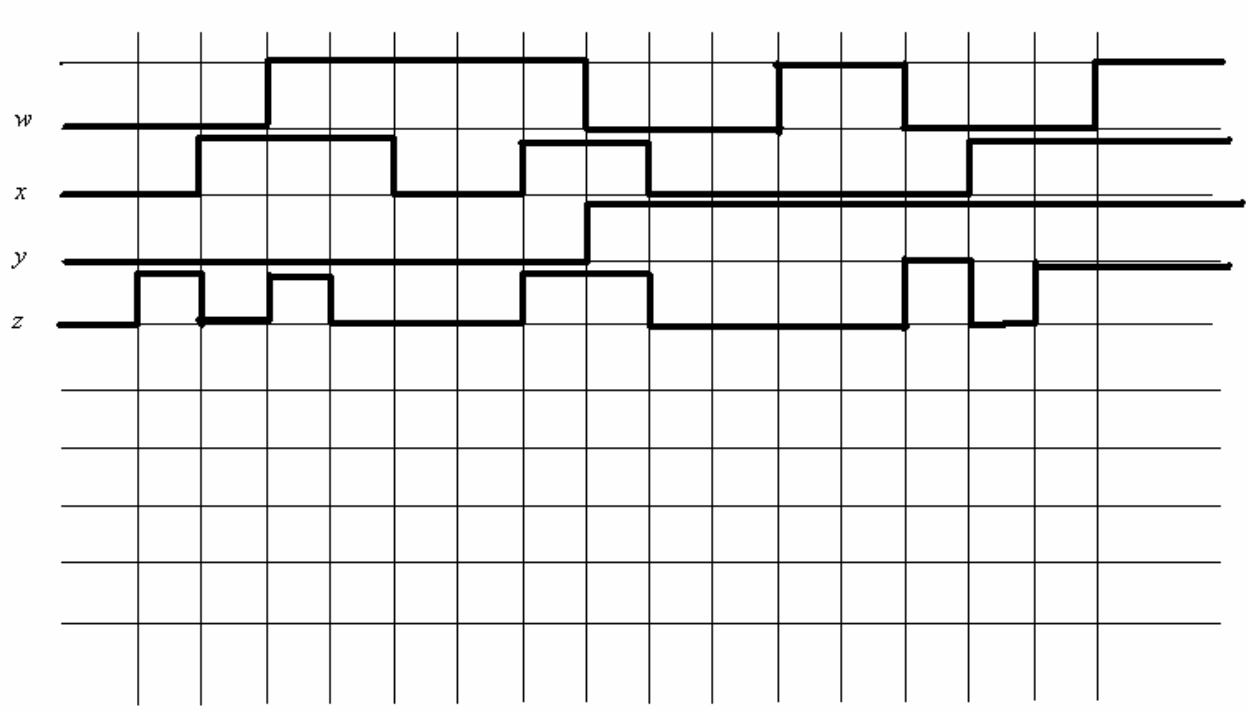
w
x
y
z