

**EE-18
Exam 1
Fall 1997
Prof. Traver**

Name _____

1. (10 points) Convert the following numbers from the given bases to the other bases listed in the table.

Decimal	Binary	Octal	Hexidecimal
27.5	11011.1	33.4	1B.8
103.25	1100111.01	147.2	67.4

2. (10 points) Perform the following arithmetic operations on the binary numbers below.

$\begin{array}{r} 111101 \\ +10111 \\ \hline 1010100 \end{array}$	$\begin{array}{r} 10010 \\ -1101 \\ \hline 101 \end{array}$	$\begin{array}{r} 1101 \\ \times 111 \\ \hline 1011011 \end{array}$
---	---	---

3. (10 points) Use Boolean algebra to find the complement of F in sum of product form.

$$\begin{aligned}
 F &= (AB' + C)D \\
 F' &= [(AB' + C)D]' \\
 &= (AB' + C)' + D' \\
 &= (AB')'C' + D' \\
 &= (A' + B)C' + D' \\
 &= A'C' + BC' + D'
 \end{aligned}$$

4. (15 points) Find

a. the truth table for F

$$F = (AB + B')C$$

A	B	C	F
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

and write F in

b. sum of minterm form:

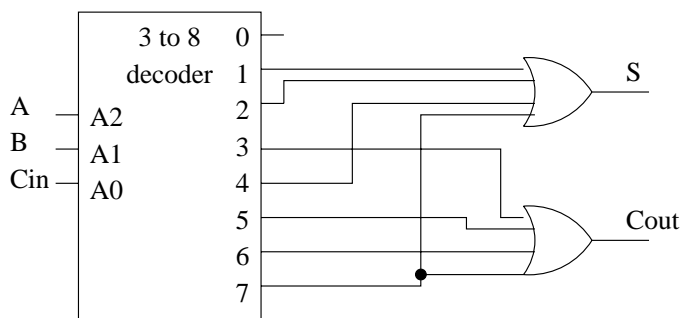
$$F = A'B'C + AB'C + ABC$$

c. product of maxterm form:

$$F = (A + B + C)(A + B' + C)(A + B' + C')(A' + B + C)(A' + B' + C).$$

5. (15 points) Implement a full adder circuit using the 3 to 8 decoder shown below and additional gates.

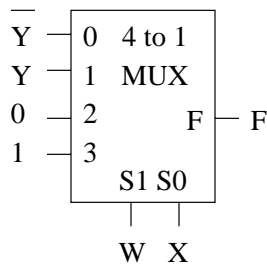
A	B	Cin	Cout	S
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1



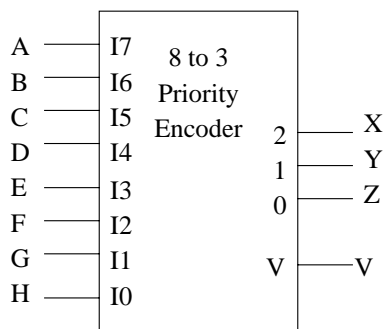
6. (15 points) Implement the following function using the 4 to 1 multiplexer given.

$$F(W,X,Y) = \prod M(1,2,4,5)$$

A	B	C	F
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1



7. (10 points) The inputs shown below are applied to the priority encoder. Give the outputs for these inputs. The inputs with the largest number have the highest priority.



inputs								outputs				
A	B	C	D	E	F	G	H	X	Y	Z	V	
0	1	0	1	0	0	0	0	1	1	0	1	(a valid "6")
0	0	0	0	1	1	0	0	0	1	1	1	(a valid "3")

8. (15 points)

a. Find the minimum sum of product expression for F from the map given below.

AB \ CD	00	01	11	10
00	1}	X	0	{1
01	1}	{1	1}	{1
11	0	{1	1}	X
10	0	0	X	X

$$F = A'D' + BD$$

b. In your expression, what is F for ABCD=1010?

$$F = 0$$

c. Show a circuit that implements F using only NAND gates. You may assume that all variables and their complements are available.

