Quiz 1 CSCI 255 Spring 2001 **Solution**

26 February, 2001

Name: ______________________

This is a closed book exam. Use of calculators is also not allowed. Be sure to show your work in order to get full credit for the problem. When possible place your answers in the provided boxes.

Problem 1 (8 points): 3:15-3:21

Convert the following two numbers from decimal notation into eight-bit twos-complement notation.

-25	17
11100111	**00010001**

Problem 2 (8 points): 3:21-3:27

Convert the following two numbers from eight-bit twos-complement notation into decimal notation.

00010001	11111000
17	**-8**

Problem 3 (4 points): 3:27-3:30

Express the following decimal numbers in base 7.

50
101

Problem 4 (12 points): 3:30-3:39

Add the following two pair of eight-bit twos-complement numbers. Which, if any, of the additions results in an overflow?

10011110	11111100
+ 10101000	+ 10101000
01000110	**10100100**
overflow occurs	**no overflow**

Problem 5 (8 points): 3:39-3:45

Compute the following bit-wise logical operations on four-bit binary numbers.

NOT(1010) AND 0011 **0101 AND 0011** **0001**	NOT (1010 OR 0011) **NOT 1011** **0100**

Problem 6 (8 points): 3:45-3:51

Complete the following truth tables for the two given Boolean equations:

X	*y*	$(x + y)' + y$
0	0	**1**
0	1	**1**
1	0	**0**
1	1	**1**

x	*y*	$(x + x')y$
0	0	**0**
0	1	**1**
1	0	**0**
1	1	**1**

Problem 7 (8 points): 3:51-3:57

Translate the following truth table into a Boolean equation.

$x'\,y\,z' + x'\,y\,z + x\,y'\,z'$

x	*y*	*z*	out
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	0

Problem 8 (8 points): 3:57-4:03

Assume Z is a C integer variable. Write a C statement that will set bits 8 and 9 of Z to 1 and clear bits 4 and 5 to 0.

```
Z = (Z | 0x300) & ~0x30 ;
```

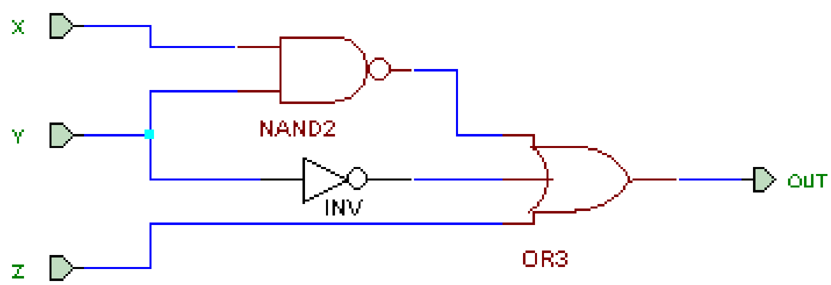
Problem 9 (8 points): 4:03-4:09

Convert the following 16-bit binary numbers to hexadecimal numbers.

1010000001111111 **A07F**	0000110010011011 **0C9B**

Problem 10 (8 points): 4:09-4:15

Fill in the truth table on the right to reflect the output of the circuit on the left.



x	*y*	*z*	Out
0	0	0	**1**
0	0	1	**1**
0	1	0	**1**
0	1	1	**1**
1	0	0	**1**
1	0	1	**1**
1	1	0	**0**
1	1	1	**1**

Problem 11 (20 points): 4:15-4:30

How have the following five concepts or standards been used in CSCI 255:

ASCII **Standard code for mapping letters into binary**
Combinational circuit **A circuit where the present output always depends solely on that present input.** **Even a wire or a one-gate circuit can be combinational.**
IEEE floating point format **Standard binary representation of "real" numbers expressed in scientific notation**
Multiplexer **A circuit that receives 2^m data inputs and m selector inputs and produces a single selected data output.**
P-type transistor **Used to build inverters** **Conducts when its gate is low**