ECE/CS 252: INTRODUCTION TO COMPUTER ENGINEERING

UNIVERSITY OF WISCONSIN—MADISON

Prof. Mikko Lipasti & Prof. Gurinder S. Sohi

TAs: Daniel Chang, Philip Garcia, Sean Franey, Vignyan Kothinti Naresh, Felix Loh, Raghu Raman and Newsha Ardalani

Midterm Examination 1

In Class (50 minutes)

Wednesday, September 29, 2010

Weight: 12.5%

NO: BOOK(S), NOTE(S), CALCULATORS OF ANY SORT.

The exam has nine pages. Circle your final answers. Plan your time carefully, since some problems are longer than others. Must turn in the pages 1-8

LAST NAME: _____

FIRST NAME: _____

SECTION: _____

ID# _____

Section	Maximum Points	Actual Points
1	7	
2	8	
3	6	
4	4	
5	5	
Total	30	

SECTION 1: Number Conversions

Q1. Convert the binary number `01100100001011101011011001111001110101` into Hexadecimal. (2 points)

Q2. What is the decimal value (base 10) of the unsigned fixed point binary number `011010.011`?(2 points)

Q3. Given the binary number `11000001001101000000000000000000` in IEEE floating point format (format shown below), what is the value in decimal (base 10) equivalent? (3 points)

sign (1 bit)	exponent (8 bits)	fraction (23 bits)

SECTION 2: SIGNED NUMBERS

Q4. Fill in the following boxes with appropriate values. If there are more than one values possible, write all the possible values. Mark in "NA" if something is not possible (8 points)

	255	**-128**	**0**	**-127**
8-bit Unsigned				
8-bit Sign Magnitude	*NA*	*NA*		
8-bit 1's Complement	*NA*	*NA*		
8-bit 2's Complement				
9-bit 2's Complement				

SECTION 3: BINARY OPERATIONS

Q5. Given the 4-bit hexadecimal numbers (base 16): A and 3, evaluate the following expression. Give your answer in Hexadecimal(base 16) representation.(3 points)

(not(A) and (3)) or (not(3) and (A))

Q6. Add the following 5-bit two's complement binary numbers: `10010 + 11110`. Express your answer in 5-bit two's complement. Indicate and explain why the output is correct or incorrect. (3 points)

SECTION 4: ASCII Conversion

Q7. Convert the null terminated string "Wi$" into binary sequence of ASCII codes. (See attached ASCII table.) (2 points)

Q8. Convert the binary sequence of 8-bit ASCII codes

`00110010 00100100 01011010 00000000` **into a string. (2 points)**

SECTION 5: Assorted

Q9. For each row, mark against the column that is a best possible match. The first one has been done for you (5points)

	Has two representations for Zero	**Universal Turing Machine**	1000	**Algorithm properties**	**NONE**
Definiteness				*X*	
Accepts both instructions and data as inputs					
Sign Magnitude Representation					
64GB Flash drive					
-8					
1's complement Representation					
Desktop processor					
-7					
Finiteness					
One thousand					
Cash Register					

ASCII Table

Character	*Hex*	*Character*	*Hex*	*Character*	*Hex*	*Character*	*Hex*
nul	00	sp	20	@	40	`	60
soh	01	!	21	A	41	a	61
stx	02	"	22	B	42	b	62
etx	03	#	23	C	43	c	63
eot	04	$	24	D	44	d	64
enq	05	%	25	E	45	e	65
ack	06	&	26	F	46	f	66
bel	07	'	27	G	47	g	67
bs	08	(	28	H	48	h	68
ht	09	)	29	I	49	i	69
lf	0A	*	2A	J	4A	j	6A
vt	0B	+	2B	K	4B	k	6B
ff	0C	,	2C	L	4C	l	6C
cr	0D	-	2D	M	4D	m	6D
so	0E	.	2E	N	4E	n	6E
si	0F	/	2F	O	4F	o	6F
dle	10	0	30	P	50	p	70
dc1	11	1	31	Q	51	q	71
dc2	12	2	32	R	52	r	72
dc3	13	3	33	S	53	s	73
dc4	14	4	34	T	54	t	74
nak	15	5	35	U	55	u	75
syn	16	6	36	V	56	v	76
etb	17	7	37	W	57	w	77
can	18	8	38	X	58	x	78
em	19	9	39	Y	59	y	79
sub	1A	:	3A	Z	5A	z	7A
esc	1B	;	3B	[	5B	{	7B
fs	1C	<	3C	\	5C	|	7C
gs	1D	=	3D	]	5D	}	7D
rs	1E	>	3E	^	5E	~	7E
us	1F	?	3F	_	5F	del	7F