ECE/CS 252: INTRODUCTION TO COMPUTER ENGINEERING

UNIVERSITY OF WISCONSIN—MADISON

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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

190BAD9E75

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

26.375

Q3. Given the binary number 1100000100110100000000000000000 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)

-11.25

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	1111 1111	NA	0000 0000	NA
8-bit Sign Magnitude	NA	NA	0000 0000 1000 0000	1111 1111
8-bit 1's Complement	NA	NA	0000 0000 1111 1111	1000 0000
8-bit 2's Complement	NA	1000 0000	0000 0000	1000 0001
9-bit 2's Complement	0 1111 1111	1 1000 0000	0 0000 0000	1 1000 0001

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))

0x9

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)

10000 \rightarrow -16 decimal : Answer is correct since the least number represented by 5-bits is -16 in 2's complement

SECTION 4: ASCII Conversion

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

0101 0111 0110 1001 0010 0100 0000 0000

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

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

2sZ

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

Scratch Sheet (in case you need additional space for some of your answers)

ASCII Table

Character	Hex	Character	Hex	Character	Hex	Character	Hex
nul	00	sp	20	@	40	*	60
soh	01	!	21	А	41	a	61
stx	02		22	В	42	b	62
etx	03	#	23	C	43	с	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	Н	48	h	68
ht	09)	29	I	49	i	69
1f	0A	*	2A	J	4A	j	6A
vt	0B	+	2 B	K	4B	k	6B
ff	0C		2C	L	4C	1	6C
cr	0D	-	2D	М	4D	m	6D
SO	0E		2E	N	4E	n	6E
si	0F	/	2F	0	4F	0	6F
dle	10	0	30	Р	50	р	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	Т	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	у	79
sub	1A	:	3A	Z	5A	z	7A
esc	1B	;	3B]	5 B	{	7B
fs	1C	<	3C	X	5C	1	7C
gs	1D	=	3D]	5D	}	7D
rs	1E	>	3E	^	5E	~	7E
us	1F	?	3F	_	5 F	del	7 F