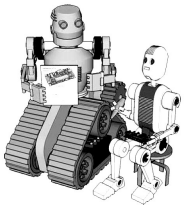
NAME _____

1st Semester Midterm

10/09/08
BCHS Advanced Computer Programming
Introduction to Robotics
4th Period 2008-2009



Take Home Test: Answer questions in a way that shows you understand why rather then give an example to show how. Convince me you that you understand the material.

Data Representation

1. Why do we use the binary number system when working with computers ?

   _____

2. Why do we use the hexadecimal number system when working with computers ?

   _____

   _____

3. Count from 0_{10} to 10_{10} in base 3.

   ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

4. Computers store information in 0's and 1's. Is it possible to tell exactly what bytes from memory mean without additional information?

5. Add the following binary unsigned numbers

```
0101      0101      01110101
1011      111       10001110
----      ----      --------
```

6. What is a 1's compliment of a binary number, can you think of two uses for it?

   _____

7. What are 2's compliment binary numbers and why are they useful ?

   _____

   _____

_____/_____

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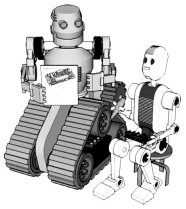

8. On several occasions we talked about the difference between the 2's compliment representation of a number and taking the 2's compliment of a number. What does each mean?

   _____

   _____

   _____

   _____

9. What is the 4 bit 2's compliment representation of these numbers

   5_{10} _____
   -5_{10} _____
   100_{10} _____

10. Take the 2's compliment of the following binary number.

    0B00000001

11. Work this problem. Subtract 0x30 from 0x55 using 2's compliment and show your work in great detail. Write clearly!

12. What does BCD stand for. What use is it?

    _____

    _____

_____/_____

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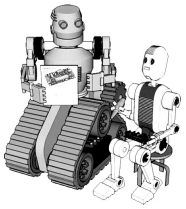


13. Count for 010 to 1510 in BCD.

___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

14. There are several ways to convert numbers from binary to hex.
    Describe the fastest way.

_____

_____

_____

15. Describe a method to convert hex numbers to decimal.

_____

_____

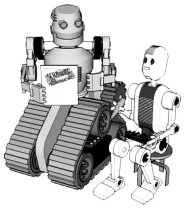
_____

_____

16. Convert 0x4A to decimal using the method you described above.
    Show work in detail, write clearly.

17. The smallest unit of computer memory it the bit.
    There are ___ bits in a byte and ___ bits in a nibble.

_____/_____



Bonus question (1pt).
In class I talked about three pets I had named bit, byte, and nibble. Where they spiders, fish, dogs, or cats? _____

18. You found an old computer in your grandmothers attic. The computer starts and is prompting you for a password. The documentation you found with the computer says the password is stored at memory location 0x100 and is always 5 characters long. Using a stand alone memory tool you were able to determine that memory starting at location 0x100 contained the following.

    0X41 0x53 0x43 0x49 0x49
    What is the password ? _____

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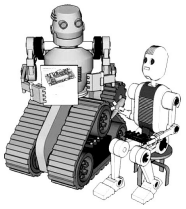

The C language

19. What is a variable ?

_____

_____

20. Given the following.

```
#pragma config LVP=OFF, ...
#include <p18F1320.h>
```

What do #pragma's do in general ?

_____

What does this #pragma do ?

_____

Where can you find information on what parameters to add after the config keyword?

_____

What do #include's do in general ?

_____

Why do we need this #include ?

_____

Bonus (2pts)
What is the difference between #include <filename> and #include “filename ?

_____

_____/_____

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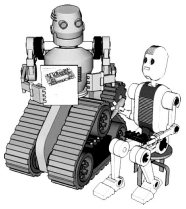

21. Matching, do you know you numeric data types?
Answers may be used more the once.

___	`char x;`	a	`0..255`
___	`unsigned int;`	b	`-32768..32767`
___	`int x;`	c	`-32768..32768`
___	`unsigned int x;`	d	`0..65535`
___	`unsigned char x;`	e	`0..65535`
___	`unsigned x;`	f	`-128..128`
		g	`-128..127`
		h	`None of the above`
		i	`ERROR: Invalid variable declaration`

22. Answer the questions about this code.

```
1  int aa;
2  void main(void)
3  {
4    int bb;
5    aa = 4;
6    {
7      int cc;
8      cc = 5;
9      if (aa<9)
10     {
11       cc = cc+aa;
12       cc--;
13     }
14     Nop();
15   }
16   aa=cc;
17 }
```

After line 5 aa is ____.

On line 14 cc is ____.

On line ____ variable ___ is out of scope.

Why did I start a new code block on line 6.

_____

Why did I start a new code block on line 10 ?

_____

23. What is the purpose of Nop() ?

_____

_____/_____

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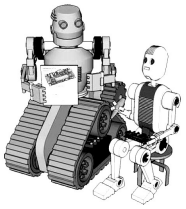

24. Name the three for loop parameters.

for(; ;)

25. Write a for loop that ranges variable aa from:

0..5	for(; ;)
-3..5	for(; ;)
5..0	for(; ;)
5..-3	for(; ;)
0x10..0x2A	for(; ;)
0b00,,0x23	for(; ;)

26. Write a while loop that ranges variable aa from:

0..5	while ( )
	{
	
	}

-3..5	while ( )
	{
	
	}

27. In the MPLAB you press control-WHAT to find matcing braces ?

Cntrl-____

28. If you do can not see the build icon in MPLAB it is because you opened a _____ instead of a _____.

_____/_____

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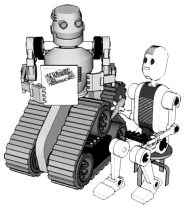

29. Find all the errors in the following code. Correct them.

```
1 {
2     unsigned char a;
3     unsigned char b;
4     for(a=0;a<24;a++)
5     {
6       if (a==i) && (!b))
7       {
8         a++
9         b--;
10      }
11 }
```

Comments:

30. Matching

	Arithmetic		Meaning
	+	a	Division
	-	b	Remainder or modulo
	/	c	Addition
	%	d	Decriment
	--	e	Subtraction
	++	f	Incriment

31. Why do we use code blocks ? _____

_____

_____

_____/_____

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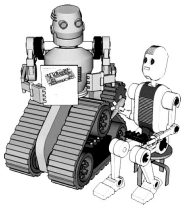

Logic Gates

32.

_____/_____

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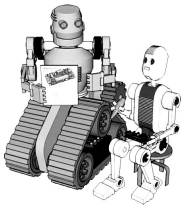

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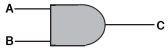
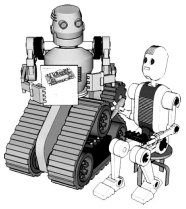
<tr><td>symbol</td><td> 
</td><td></td></tr>
<tr><td>truth table</td><td></td><td>
<table>
<tr><th>INPUT(A)</th><th>INPUT(B)</th><th>OUTPUT(C)</th></tr>
<tr><td>0</td><td>0</td><td></td></tr>
<tr><td>0</td><td>1</td><td></td></tr>
<tr><td>1</td><td>0</td><td></td></tr>
<tr><td>1</td><td>1</td><td></td></tr>
</table>
</td></tr>
<tr><td></td><td>NAND</td><td>NOR</td></tr>
<tr><td>symbol</td><td></td><td></td></tr>
<tr><td>truth table</td><td></td><td></td></tr>
</table>

_____/_____



INPUT(A)	INPUT(B)	OUTPUT(C)
0	0	
0	1	
1	0	
1	1	