

**UNC Charlotte, Department of Electrical and Computer Engineering**  
**ECGR 4101/5101, Fall 2008, Homework #3**  
**Due: 9/24/2008, at the beginning of class (20 points)**

**Assignment should be typed, a hard copy turned in to instructor**

You will need to refer to the M16C/20/60 Software Manual, the M16C62P Hardware Manual and M16C C Language Programming Manual to complete this assignment. They are available online through the Documentation contained in the SKP16C62P directories link on the course home page.

0. 1 pt: How long did this homework take you?
1. 8 pts: Assume the following C program is executed. Show the contents of the variables after execution completes, assuming their addresses are as given below. Represent data “naturally” – integers should be shown as big-endian values, strings as a sequence of characters, and characters as the actual character (not the ASCII code).

```
// global area
char s1[20];
char c, d;
int i, j, k;
char *pc;
int *pi1, *pi2;

void main() {
    i = 1;
    j = 141;
    k = 214;
    strcpy(s1, "one five");
    pc = &s1[5];
    d = *pc;
    pc = strchr(s1, 'e');
    strcpy(pc, "kcm");
    pc++;
    c = *pc;
    i = 481;
    pi1 = &j;
    *pi1 = i;
    pi2 = &i;
    i -= 21;
    k = *pi1 + *pi2;
    pi2--;
}
```

Var	Addr	Intermediate Values						Final Value
s1	980h	_____	_____	_____	_____	_____	_____	
c								
d								
i								
j								
k								
pc								
pi1								
pi2								

2. 6 pts: Show how the following C arrays are laid out in memory. Remember to pay attention to endianness, indicating which byte is located where.

**a. int a[7];**

Address	Array Element	Which byte?
a		
a+1		
a+2		
a+3		
a+4		
a+5		
a+6		
a+7		
a+8		
a+9		
a+10		
a+11		
a+12		
a+13		
a+14		
a+15		

**b. unsigned char b[4][2]**

Address	Array Element	Which byte?
b		
b+1		
b+2		
b+3		
b+4		
b+5		
b+6		
b+7		
b+8		
b+9		
b+10		
b+11		
b+12		
b+13		
b+14		
b+15		

3. 5 pts: Read the article “Twenty-Five Most Common Mistakes with Real-Time Software Development”. How many of these problems are related to designing software versus writing code? In four sentences, make your observation.