UNCC, Department of Electrical and Computer Engineering, ECGR4101/5101/6090, Fall 2004, Homework #7, Due: 10/22/04, at the beginning of class (20 points)

0. How long did this homework take you? (1 point)

1. Read the Jack Ganssle article "Interrupt Latency." In four lines of correct English, summarize the general objective of the article. (4 points)

2. How far apart in time can two interrupts be yet still be considered simultaneous if an M16C26 processor's clock is 4 MHz? SHOW YOUR WORK. (1 point)

3. For the M16C/262, list the following interrupts in order of decreasing priority: single-step, NMI, watchdog timer, reset, ADC conversion complete, UART1transmit, Timer B2. (1 point)

4. Assume an enabled interrupt has occurred. Fill in the contents of the stack and update the registers listed when the processor is about to begin executing the ISR at address 0x0ff440. Recall that the FLG register is modified when the processor responds to an interrupt. Assume the following processor state immediately before the interrupt occurred. (8 points)
    - SP = 0x200,
    - PC = 0xff312
    - FLG = 0x3062
    - Stack contents as shown in table below.

Address	Value
0x01f9	
0x01fa	
0x01fb	
0x01fc	
0x01fd	
0x01fe	
0x01ff	
0x0200	
0x0201	

Register	Initial Value	Final Value
SP	0x0200	
PC	0x0ff312	
FLG	0x3062	

5. Correct the three problems with the following interrupt service routine declaration. (2 point)
```
#pragma new_isr INTERRUPT
int new_isr(int n) {
...
}
```

6. Modify the following code from sect30_26skp.inc to register the C function raise_shields() as the interrupt service routine for external interrupt 0. (3 points)

```
.section vector          ; variable vector table
.org VECTOR_ADR
.lword dummy_int         ; vector 0 (BRK)
.org (VECTOR_ADR +16)
.lword dummy_int         ; INT3
.lword dummy_int         ; Reserved
.lword dummy_int         ; Reserved
.lword dummy_int         ; Reserved
.lword dummy_int         ; INT5
.lword dummy_int         ; INT5
.lword dummy_int         ; UART2 Bus collision detection iic
.lword dummy_int         ; DMA0 (for user)
.lword dummy_int         ; DMA1 (for user)
.lword dummy_int         ; Key-on wakeup (for user)
.lword dummy_int         ; AD Converter (for user)
.lword dummy_int         ; UART2 transmit/NACK
.lword dummy_int         ; UART2 receive/ACK
.lword dummy_int         ; UART0 transmit (for user)
.lword dummy_int         ; UART0 receive
.lword dummy_int         ; UART1 transmit (for user)
.lword dummy_int         ; UART1 receive:
.lword dummy_int         ; TIMER A0 (for user)
.lword dummy_int         ; TIMER A1 (for user)
.lword dummy_int         ; TIMER A2 (for user)
.lword dummy_int         ; TIMER A3 (for user)
.lword dummy_int         ; TIMER A4 (for user) (vector 25)
.lword dummy_int         ; TIMER B0 (for user) (vector 26)
.lword dummy_int         ; TIMER B1 (for user) (vector 27)
.lword dummy_int         ; TIMER B2 (for user) (vector 28)
.lword dummy_int         ; INT0 (for user) (vector 29)
.lword dummy_int         ; INT1 (for user) (vector 30)
.lword dummy_int         ; Reserved
```