First:________________ Middle Initial: _____ Last:____**Solution**_____

This is a closed book exam. You must put your answers on this piece of paper only. You have 50 minutes, so allocate your time accordingly. ***Please read the entire quiz before starting.***

(5) Question 1. $56

(5) Question 2. $3900 wrap

(5) Question 3.

```
               X=>  0  data
0                   1  Old X
                    3  Return address
                    5  in
```

(5) Question 4. **5**

(5) Question 5. R1 = (5-2.5-0.5V)/0.001A = 2000 Ω = 2 k Ω

(5) Question 6.
C) The I bit in the CCR is clear
D) The software arms the interrupt (e.g., RTIE=1)
G) The hardware sets the flag bit (e.g., RTIF=1)

(5) Question 7. Resolution = range/precision = 20V/1023 ≈ 20mV

(5) Question 8.
The first guess is half way in between 0 and 5V
E) 2.5 V

(5) Question 9. C) This ISR did not acknowledge the interrupt (clear RTIF), so it will interrupt over and over continuously.

(15) Question 10.

```
      org  $3800     ;globals in RAM
count rmb 2          ;16-bit debugging counter
      org  $4000     ;programs in ROM
Init  movw #0,count  ; initialize counter
      rts
Pulse bset PTT,#1  ; send pulse on PT0
      bclr PTT,#1

      pshx         ;don't want to mess up system
      ldx count
      inx          ;debugging instrument
      stx count
      pulx

      rts
```

(15) Question 11.

```
Convert
   ldd 0,Y    ; RegD = 0 to 1023, the input data
   ldx #26214 ; RegX = 65536/2.5
   fdiv       ; RegX = (65536*Input)/(65536/2.5)
   tfr  X,D   ; RegD = 2.5*Input
   addd #100  ; Output = 2.5*Input+100
   rts
Convert2
   ldd 0,Y    ; RegD = 0 to 1023, the input data
   lsld       ; 2*Input
   pshd
   ldd 0,Y    ; second copy of input data
   lsrd       ; Input/2 (ignore LSB error)
   addd 2,sp+ ; 2*Input+Input/2
   addd #100  ; Output = 2.5*Input+100
   rts
```

(5) Question 12.

baud rate = 2000 bytes/sec *1 frame/byte* 11 bits/frame = 22000 bps

(20) Question 13.

```
calc                            ;short calc(void){
sum set 2
n   set 0                       ;short sum,n;
    leas -4,sp  ;allocate

    movw #100,n,sp              ;n = 100;

    movw #0,sum,sp              ;sum = 0;

loop
    ldd  sum,sp                 ;do{ sum = sum+n;
    addd n,sp   ;sum+n
    std  sum,sp

    ldx  n,sp                   ;} while(--n);
    dex
    stx  n,sp
    bne  loop
    ldd  sum,sp                 ;return(sum);}
    leas  4,sp
    rts
```