EEEN 3449
Test # 1 Spring 2007 **Name:**_____

It will be your loss if I cannot read your handwriting. Please write clearly!

1. Modify the following program to determine the sum of all the odd numbers in the array. Please provide comment statement for each instruction. (25 pts)

```
N       equ     10              ; array count
        org     $1000           ; starting address of on-chip SRAM
sum     rmb     2               ; array sum
i       rmb     1               ; array index
        org     $1500           ; starting address of the program
        ldaa    #0
        staa    i               ; initialize loop (array) index to 0
        staa    sum             ; sum ← 0
        staa    sum+1           ;       "
loop    ldab    i
        cmpb    #N              ; is i = N?
        beq     done            ; if done, then branch
        ldx     #array          ; use index register X as a pointer to the array
        abx                     ; compute the address of array[i]
        ldab    0, x            ; place array[i] in B
        ldy     sum             ; place sume in Y
        aby                     ; compute sum ← sum + array[i]
        sty     sum             ; update sum
        inc     i               ; increment the loop count by 1
        bra     loop
done    swi                     ; return to D-Bug12 monitor
array   dc.b    21,32,23,41,51,16,27,18,19,10
        end
```


2. i) Convert the **unsigned values** into the desired format:

a) 54_{10} = % 00110110 answer in binary (3 pts)

b) %1010 1100 = 172 answer in decimal (3 pts)

c) 77_{10} = $ 4D answer in hexadecimal (3 pts)

d) $5C4A + $26CE = $ 8318 answer in hexadecimal (3 pts)

e) $8A7E + $2C4B = $ B6C9 answer in hexadecimal (3 pts)

f) $5274 – $2DFE = $ 2476 answer in hexadecimal (3 pts)

g) $C3A4 – $4B7D = $ 7827 answer in hexadecimal (3 pts)

ii) Convert the following decimal number to 8-bit **signed** binary value:

a) -54_{10} = % 1100 1001 +1 = % 11001010 (3 pts)

iii) Convert the 8-bit **signed** values to binary first, then to decimal:

a) $9C = % 1001 1100 (3 pts)
(MSB =1, indicates it is in 2's complement)

= $ 0110 0011 +1 = % 0110 0100 =100_{10} (3 pts)

The decimal value = -100_{10}

3. The register and memory contents are as shown below. For each of the following instructions, specify the effective address and the resulting operation. In particular specify what value(s) is stored into what memory locations. Give all your answers in hexadecimal. (20 pts)

[X]=$1015 ; [Y]=$1054 ; [A]=$06 ; [B]=$04

Note: Each instruction is an individual instruction.

Mnemonic	Effective Address(s)	Content of the Effective Address(s)	The value in Y or X after executes the statement
STAB A,Y	$105A	$04	$1054
STAA B,Y-	$1054	$06	$1050
STAA A,+X	$101B	$06	$101B
STAB 3,–Y	$1051	$04	$1051
STAA 4,X+	$1015	$06	$1019
STD B,Y	$1058 $1059	$06 $04	$1054

4 Write a program using a loop to determine the number of 1s in memory location $1100. Please provide comment statement for each instruction. (25 pts)
