TEST ora 14

Name and group: ____________________

1. Number conversions:

a. 123 = 1111011 b = 7B h

b. 10101011b = 0AB h = 171/-85 (base ten)

7 5 3 1 0 $1\cdot2^7+1\cdot2^5+1\cdot2^3+1\cdot2^1+1\cdot2^0=171$ (unsigned)

= -85 (signed)

(256-171=85)

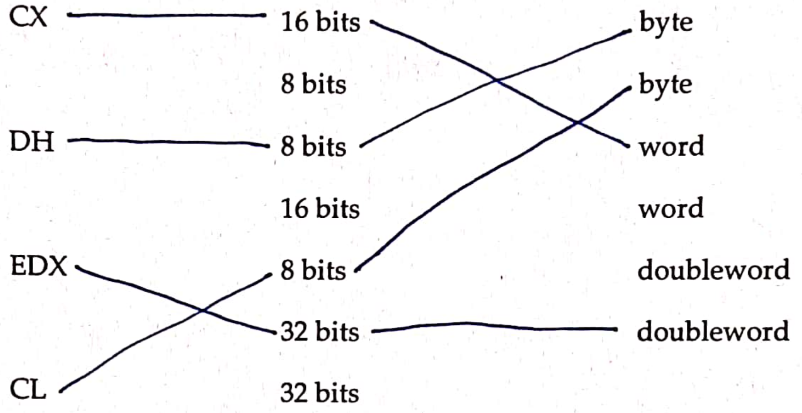
1010|1011b

A B

123:2=61 r 1
61:2=30 r 1
30:2=15 r 0
15:2=7 r 1
7:2=3 r 1
3:2=1 r 1
1:2=0 r 1

123:16 = 7 r 11 (B)
7:16=0 r 7

2. Specify the dimesion and the type drawing the correct arrows between the next columns.



CX

DH

EDX

CL

16 bits

8 bits

8 bits

16 bits

8 bits

32 bits

32 bits

byte

byte

word

word

doubleword

doubleword

3. Write the code to compute (please write the comments to see the output registers)

a. 3 * X - 7, X-word (unsigned) ~~(signed)~~

```
; 3·x
mov ax, 3
mul word [x]; 3·x= dx:ax
; 7-> cx:bx
mov bx, 7
mov cx, 0
; dx:ax-
  cx:bx

sub ax, bx
sbb dx, cx   ;dx:ax=3·x-7
```

b. Y / 13 + 10101b, Y – doubleword (signed)

```
; y/13
; y -> doubleword dx:ax
mov ax, word [y+0]
mov dx, word [y+2]
mov bx, 13
idiv bx ; dx:ax/13 = ax-q
                     dx-r
; 10101b- const (byte)

add ax, 10101b
   ;ax=y/13+10101b
```

Name and group: ______________________

4. Write the output value, line by line from registers, if the next code is executed:

mov al, 00001000b ; $al = 0000\ 1000b = 8$ (decimal)

add al, 2 ; $al = al + 2 = 8 + 2 = 10$

sub al, 10 ; $al = 10 - 10 = 0$

STC ; $cf = 1$

RCL al, 1 ; $al = 0000\ 0000b,\ cf = 1 \Rightarrow$ rcl al, 1 $\Rightarrow al = 00000001b$

mov bl, 2 ; $bl = 2$

mov cl, 3 ; $cl = 3$

imul cl ; $cl \cdot al = 3 \cdot 00000001b = \underline{\underline{3}}$ (byte · byte = $\underline{\underline{ax}}$)

5. How the next variables are represented in memory (in the hex dump section from olldbg)?

a db 14 ; $a = 14 = 0Eh$

b dw 14 ; $b = 14 = 000Eh$

c dd 14 ; $c = 14 = 0000000Eh$

d dq 14 ; $d = \underbrace{0 \dots 0}_{15}Eh$

e db -14 \
f dw -14

$\rightarrow -14$ – Two's complement: $= 1111.0010b = F2h$ → FFF2h

1) $|-14| = 0000\ 1110$

2) $1111\ 0001 + 1$

3) $\underbrace{1111}_{F},\underbrace{0010}_{2}b$

in memory: - in hexadecimal
- little-endian (bytes in reversed order)

$\Rightarrow \frac{0E}{a+0} \quad \frac{0E}{b+0}\ \frac{00}{b+1} \quad \frac{0E}{c+0}\ \frac{00}{+1}\ \frac{00}{+2}\ \frac{00}{+3}$

$\frac{0E}{d+0}\ \frac{00}{+1}\ \frac{00}{+2}\ \frac{00}{+3}\ \frac{00}{+4}\ \frac{00}{+5}\ \frac{00}{+6}\ \frac{00}{d+7}$

$\frac{F2}{e+0} \quad \frac{F2}{f+0}\ \frac{FF}{f+1}$

TEST ora 15

Name and group: ____________________

1. Write the code to compute (please write the comments to see the output registers)

a. 17 – Z * 5, Z-word (unsigned)

a)
```
mov ax, 5 ; ax=5
mul word [z]; z·ax = z·5=dx:ax
;17 - dx:ax
=> 17 -> cx:bx
mov bx, 17 ; bx=17
mov cx, 0 ; cx=0
; cx:bx -
; dx:ax
;
sub bx, ax ; cx:bx=
sbb cx, dx ; 17-z·5
```

b. T / 21 + 1A2Bh, T – doubleword (signed)

```
b) ; T=>dx: ax
mov ax, word [T+0] ; dx:ax=T
mov dx, word [T+2]
mov bx, 21
idiv bx ; dx:ax/bx= ax-q (T/21)
                    dx-r
;1A2B - const in hex (word)
add ax, 1A2Bh; ax=ax+1a2bh
```

2. Write the output value, line by line from registers, if the next code is executed:

mov BL, 00001100b ; bl=00001100b = $1\cdot2^2+1\cdot2^3$ = 12 (decimal)

sub BL, 2 ; bl= bl-2 = 12-2 = 10

sub BL, 10 ; bl = bl-10 = 10-10=0

STC ; cf=1

RCR BL, 1 ; bl=00000000b, cf=1 => rcr bl, 1 => bl= 10000000b

mov AL, 2 ; al=2

mov CL, 3 ; cl=3

imul CL ; cl·al = 3·2 = 6 = ax (byte · byte = word ax)

3. Number conversions:

a. 214 = 11010110 b = 0D6 h

b. 10011001b = ______ h = ______ (base ten)

7 4 3 0 => $1\cdot2^0+1\cdot2^3+1\cdot2^4+1\cdot2^7$ = 153

= 153 (decimal) unsigned

= -103 (decimal) signed

$\underbrace{1001}_{9}\underbrace{1001}_{9}$ b = 99h

214 : 2 = 107 r 0

107 : 2 = 53 r 1

53 : 2 = 26 r 1

26 : 2 = 13 r 0

13 : 2 = 6 r 1

6 : 2 = 3 r 0

3 : 2 = 1 r 1

1 : 2 = 0 r 1

214 : 16 = 13 r 6

13 : 16 = 0 r 13 (Dh)

Name and group: ______________________

4. How the next variables are represented in memory (in the hex dump section from olldbg)?

a db 13 ; a=13=0Dh

b dw 13 ; b=13=000Dh

c dd 13 ; c=13=0000000Dh

d dq 13 ; $d=\underbrace{0\ldots}_{15\ 0ri}0Dh$

e db -13 ; -13=F3h

f dw -13 Two's complement:

;-13=FFF3h 1) |-13|=13= 0000 1101b
2) 1111 0010b+
3) 1
$\underbrace{1111}\ \underbrace{0011}$b=F3h

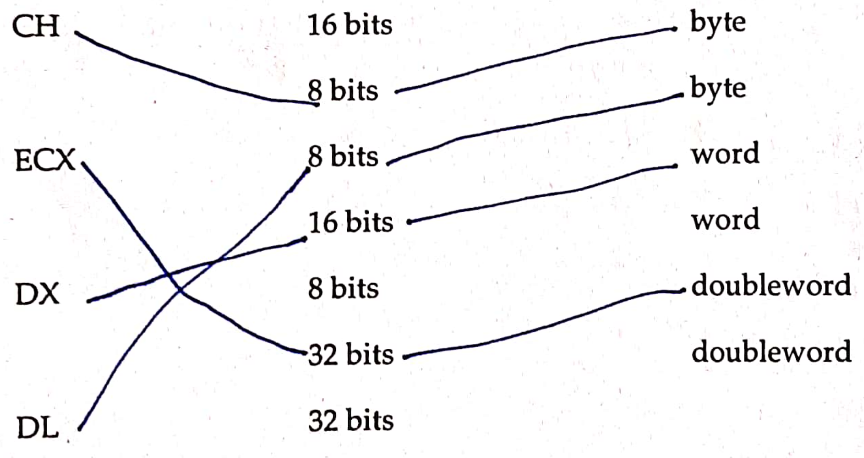
IN MEM: – in hexadecimal
– little endian (bytes in reversed order):

$\underset{a+0}{\underline{0D}}$ $\underset{b+0}{\underline{0D}}$ $\underset{b+1}{\underline{00}}$ $\underset{c+0}{\underline{0D}}$ $\underset{+1}{\underline{00}}$ $\underset{+2}{\underline{00}}$ $\underset{+3}{\underline{00}}$

$\underset{d+0}{\underline{0D}}$ $\underset{+1}{\underline{00}}$ $\underset{+2}{\underline{00}}$ $\underset{+3}{\underline{00}}$ $\underset{+4}{\underline{00}}$ $\underset{+5}{\underline{00}}$ $\underset{+6}{\underline{00}}$ $\underset{+7}{\underline{00}}$ $\underset{e+0}{\underline{F3}}$

$\underset{f+0}{\underline{F3}}$ $\underset{f+1}{\underline{FF}}$

5. Specify the dimesion and the type drawing the correct arrows between the next columns:



CH	16 bits	byte
	8 bits	byte
ECX	8 bits	word
	16 bits	word
DX	8 bits	doubleword
	32 bits	doubleword
DL	32 bits	