Name:_____

Written exam Computer System Architecture

09.02.2023, 12:30 – *working time 2h*

1. Fill the blanks:

a) Complete the "?" with the correct instruction/value such that at the end of the execution in **EAX** register will be the value of the **last doubleword (1a2b3c4dh)** from string S (considering that S can have different number of elements). Explain. *(0.5p)*

```
segment data use32 class=data
   S dd 12345678h, -2, 1a2b3c4dh
   lS equ ($-S)/4

; our code starts here
segment code use32 class=code
    start:
        ?
        mov esi, ?
        add esi, ?
        LODSD
```

b) After the next code lines are executed, which is the value from **DX** register? Explain. *(0.5p)*

```
segment data use32 class=data
   b dw -3, -1, 1122h, 3344h
segment code use32 class=code
    start:
        mov ESI, b
        cld
        lodsb
        lodsw
        lodsw
        mov DX, AX
```

c) Next code lines are executed. Choose the correct value for **BX** register. Explain why. *(0.5p)*

```
segment code use32 class=code
    start:
    mov BX, 3
    mov AX, -10
    add AX, 1
    cmp AX, -2
    ja eticheta1
    jb eticheta2
        eticheta2:
            neg BX

        eticheta1:
            inc BX
```

BX = 4 BX = 5 BX = -3 BX = -4 BX = -2 BX = -5 BX = 3 BX = 1 BX = -1

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2. Write the code sequence that computes, in the **unsigned interpretation**, the expression: **a / 5 + b – c * 6** , having the following data types: **b - quadword, a - word, c - byte**. Comment the source code. *(2.5 p)*

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3. A string of doublewords T is given. Compute string R containing only low bytes from high words from each doubleword from string S. If S = 12345678h, 1a2b3c4dh =>then D = 34h, 2bh *(2.5 p)*

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4. Draw the content of memory (the memory representation - the hex dump content from Olly Debugger) for the following data segment and code segment. *(2.5 p)*

```
12  segment data use32 class=data
13      x db 2
14      y dw 2
15      z dd 2
16      t dq 2
17      m db -11
18      n dw -11
19      o dd -11
20      p dq -11
21      r db '22+03'
22      s dw 6Ch
23      a dd 0ACDh
24      b resb 2
25      c db 11b, 1001b, 10h
26      d equ $-n
27      e db 'holiday'
28      f dw 0, 0, 0
29      g dw 0
30      h dd 0
31
32  segment code use32 class=code
33      start:
34       mov ax, word [t+4]; ax = ?
35       mov word[g], ax
36       movsx ebx, word[n]; ebx = ?
37       mov dword[h], ebx
38       mov eax, 0
39       mov al, byte[m]; al= ?
40       cbw; al-> ?
41       cwd; ax-> ?
42       mov esi, c
43       mov edi, f
44       cld
45       lodsw
46       lodsb
47       stosw
```