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Part1 – Assembly fundamentals

1. What data directive creates a 32-bit signed integer variable?

SDWORD

2. Given the number AB896745h, list out its byte values in little-endian order (from low to high memory address).

45 67 89 AB

3. Given the number AB896745h, list out its byte values in big-endian order (from low to high memory address).

AB 89 67 45

4. Define a symbolic constant that represent integer 25 in binary format.

Var1 = 11001b

5. Define a symbolic constant that represent integer 25 in hexadecimal format.

Var1 = 19h

6. What is the value of ListSize1 for the following snippet of code?

List BYTE 10, 20, 30, 40, 50 ListSize1 = ($ - list)

5

7. What is the value of ListSize2 for the following snippet of code?

List BYTE 10, 20, 30, 40, 50 Var2 BYTE 30 DUP(?) ListSize2 = ($ - list)

35

8. Which two of the following data definitions have the same contents? Justify your answer. (2 points)

List1 BYTE 18, 61h, 00010001b, 5 List2 BYTE 18h, 97, 11h, 00000101 List3 BYTE 12h, 'a', 17, 00000101b List4 BYTE 00011000b, 97, 11, 5h

List 1 and List 3 have the same content. In the array, the content has the same value. For example 18 decimal is 12 hexadecimal. 61 hexadecimal is the ascii code 'a'. 00010001b is 17 in decimal. Decimal 5 is 00000101 binary.

9. In an 8-bit register, will the addition of the signed numbers, 0111 1111 + 0100 0010 cause the Overflow Flag to set?

```
  0111 1111
+ 0100 0010
```

1100 0001

Yes it overflows.

10. In an 16-bit register, will the addition of the unsigned numbers, 1100 0001 + 0001 1111 cause the Carry Flag to set?

```
  1100 0001
+ 0001 1111
```

11100000

No, carry flag does not set.

Part2 – Declaring Data

11. Declare an uninitialized array of 40 signed doublewords named myArray.

myArray SDWORD 40 DUP (?)

12. Declare a string variable containing the word “BOOK” repeated 100 times.

Str1 BYTE 100 Dup (“BOOK”)

13. Declare a 16-bit signed integer variable and initialize it with the smallest possible negative decimal value.

Var1 SWORD -32768

14. Declare a 32-bit signed integer variable and initialize it with the largest possible positive decimal value.

Var1 SDWORD 2147483647

Part3 – Listing File for an assembly program

15. Using the AddTwo program as a reference, generate a listing file for the following program. Write down the machine code bytes generated for each instruction. (4 points)

.386 .model flat,stdcall .stack 4096 ExitProcess PROTO, dwExitCode:DWORD

.data firstval DWORD 12345678h sum DWORD 0

.code main PROC

mov eax,firstval ; write the machine code bytes for this instruction inc eax ; write the machine code bytes for this instruction inc eax ; write the machine code bytes for this instruction

mov sum,eax ; write the machine code bytes for this instruction INVOKE ExitProcess, 0 exit
main ENDP

END main

Mov eax, firstval- **A1 00000000**

Inc eax-**40**

Inc eax-**40**

Mov sum, eax- **A3 00000004**

Part4 – Integer Expression Calculation

16. Using the AddTwo program as a reference, write a program that calculates the following expression: A = A + (B * C) – D. Assign integer values to the EAX, EBX, ECX and EDX registers. Use symbolic constants to represent A, B,C and D in your code, where A = 100, B=50, C= 80 and D=200. (4 points)

```
.data
A = 100
B = 50
T = 80
D = 200

.code
main proc
        mov eax, B
        mov ebx, T
        mul ebx
        mov ecx, A
        mov edx, D

        add ecx, eax

        sub ecx, edx
```