

a) What is wrong with the following instructions?

```
MOV [DX], 1
```

```
MOV DS, @data
```

b) State the difference between the instructions JNLE and JG

c) At most, how many **different** segments can one memory byte be contained in?

b) The value of a label in a program is treated as _____

c) The directives WORD PTR and BYTE PTR are used to _____

d) State the unsigned and signed integer represented by the 8-bit hex value: 0C4H

The table given below represents a logical memory map corresponding to the data segment of a program loaded in memory. The first variable shown is an unsigned word number called `index`. Its initial value is unknown. The second variable is an array of signed word integers, with 1000h elements in it, called `intArray`. The first four elements are initialized as shown on the map, the remaining are all set to 0h.

index	?
	?
intArray	11h
	81h
	33h
	22h
	56h
	44h
	0B3h
	00h
	00h
	00h
	...

Write the source code corresponding to the definition of this data segment in assembly language.

(b) [7 marks] Use the information given in question 1. (a), and write a code fragment showing how to search `intArray` for the first occurrence of a negative number. Assume that the DS is already initialized. You must use indexed addressing mode, with BX as

the index register. When the first occurrence is found, your code must jump to a label called FOUND, with the byte offset of the element contained in BX. If no negative number is found in intArray, the code must jump to NOT_FOUND (only the code fragment is needed).

- (c) [3 marks] There are four shift instructions supported by the 8086: SAL and SAR (arithmetic shift left and right, respectively), and SHL and SHR (logical shift left and right, respectively). They all share the same syntax:

MNEMONIC reg, CL

Each one shifts the destination operand by the number of bits specified by the source operand, storing the result in the destination operand.

We now want to convert the value held in BX (which holds an offset to the word containing the first negative number in the array) into an ordinal index into intArray (that is, a positive integer ranging from 0 to 0FFFh). To do so, choose the appropriate shift instruction and demonstrate its use. Leave the results in the variable called index.

[1 mark] What does it mean when we use the **.model small** directive in our programs?

Question 3 [9 marks]

AX = 5980h BX = 019Eh CX = 1500h DX = 9881h
CS = 13ACh DS = 2790h SS = 1110h ES = 23AFh
BP = 0520h SP = 0100h SI = 0000h DI = 0000h IP = 0010h

A dump of the memory contents shows the following (all byte values in hex):
2790:0010h BC 43 01 FE AB 39 84 5C BC 43 01 FE BA 39 84 5C
2790:0020h FF 0A AB BA 33 44 7C 00 FF EF 0A 1D 33 44 7C 00

- (a) [4 marks] Provide the values requested below, after the execution of the following instructions. For full marks, show your work on right. If necessary, use the back of the page.

CMP DL, [20]
JG [BX]

DL (in Hex): _____
Carry: _____
Sign: _____

Zero: _____
Overflow: _____

- (b) [2 marks] What is the decimal value of DL, if the number is signed two's complement. Show your work.

(c) [2 marks] What is the absolute address where the conditional jump goes? Show your work.

(d) [1 mark] Will the condition jump be taken? Yes or No. _____