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Theory

Question 1

	Result
Given the following number on 6 bits: 110011 write its decimal value, interpreting the binary number as: <ul style="list-style-type: none"> • 2's complement (2'C) • Sign and magnitude (SM) 	2'C: -13 SM: -19
<i>Most significant passages to obtain the result</i> $110011 (2'C) = -(2^5 + 2^2 + 2^0) = -(8+4+1) = -13$ $110011 (SM) = -(2^4 + 2^1 + 2^0) = -(16+2+1) = -19$	

Question 2

What does vector encoding of an image mean? Compact encoding where geometrical elements of the image (e.g. lines) are identified and encoded with opportune format
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Question 3

Write the truth table of the following Boolean expression (after eventually simplifying it) $F = B \cdot (C \bar{A} + \bar{C} A) + \bar{B} \cdot (\bar{C} A + C \bar{A})$	
<i>Most significant passages to obtain the result</i> $B \cdot (CA' + C'A) + \bar{B} \cdot (\bar{C}A + C\bar{A}) = B \cdot (C'A + CA') + \bar{B} \cdot (\bar{C}A + CA') = (CA' + CA') \cdot (B + \bar{B}) = CA' + CA' = C \text{ XOR } A$	

Programming

Write a C program to extract information from a database about loading/unloading goods on a seaport dock.

The database consists in a text file whose name is passed as the only argument on the command line. Each line of the file describes goods in the format:

```
<goods> <date> <weight>
```

Goods is a string of 20 characters at most that does not contain any space, the date is a string in the format DD-MM-YYYY, the weight is an integer number in kg, positive in case of loading operation, negative in case of unloading operation. The data are separated by one space. The lines are not sorted and the number of lines is not known apriori.

For example (file **dock.txt**):

```
bananas 22-01-2011 120
apples 01-03-2011 80
mangos 03-06-2011 -100
bananas 01-02-2011 -100
mangos 15-01-2011 120
bananas 20-01-2011 80
pears 01-01-2011 80
bananas 22-01-2011 -80
```

Write a C program to display some statistics about the loading/unloading operations. The program should receive from keyboard the name of specific goods and should display on the screen:

- The total number of quintals of the selected goods that have been **loaded** (quintals have to be displayed with 2 decimal digits)
- The date of the last **loading** operation for the selected goods
- The total income derived from the **loading** operations of the selected goods, knowing that the fee is 10 cent per kg of loaded goods plus a fixed amount of 10 € per each loading operation.

Assume that the file format is correct.

For example:

```
C:\> PROG.EXE dock.txt
Insert name of goods: bananas
Total quintals of loaded bananas: 2.00
Date of last loading operation: 22-01-2011
Total income from loading operations on bananas: € 40.00
```