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<input type="checkbox"/> AAA-LIB/English <input type="checkbox"/> LIC-ZZZ/English <input type="checkbox"/> Others:									

QUESTION 1	<i>Result</i>
Given the following two numbers in pure binary expressed in base 16: AF 9B Calculate the difference and check for overflow.	Difference: Overflow:
Steps	

QUESTION 2	
Given two Boolean equations F and G described below, check the if they are equal $F = (x+y')a' + x$ $G = [(x+y')' \cdot a] \cdot x'$	
Response	

QUESTION 3	
How many bytes are occupied by a vector of length N containing numbers encoded according to the IEEE-754 floating-point arithmetic (single precision)?	
Response	

QUESTION 4 (PROGRAMMING)

The conformation of a seabed is stored in a map of size $N \times N$. The map describes the depth in meters in the range 0-5000 meters. N is a constant and known a priori defined through the *#define* directive. The integers that constitute the map are separated by a space.

Write a C program to check for any changes in the seabed due to volcanic eruptions under the sea and/or tectonic shift. In this regard, assume that you have to have two text files containing Map2.txt and Map1.txt, and the depth of the seabed is taken at 36 months after one another. The program receives 3 integer numbers passed as arguments from the command line. The first two represent the coordinates of the center of a square of size $M \times M$ all inside of the map, the third represents the value of M (assume M odd and less than N). Let's assume that the square of interest defined by the user is entirely contained in the map.

The program must check for changes in the selected region, in case of an actual change, the program must:

1. Print on the screen coordinates of the points inside of the square of interest and the corresponding percentages of variation (two decimal places) only if they are different from zero.
2. If all points inside of the square of interest have undergone the same type of variation (towards the up or down direction) but not necessarily by the same amount, print on screen the message "TECTONIC SHIFT".

Example ($N=6$)

Map1.txt	Map2.txt (ex.1)	Map2.txt (ex.2)
1200 1205 1213 1220 1225 999	1200 1205 1213 1220 1225 999	1200 1205 1213 1220 1225 999
1240 1225 1120 1130 1164 1110	1240 1225 1120 1130 1164 1110	1240 1225 1120 1130 1164 1110
1320 1230 1011 963 1102 1017	1320 1230 1011 963 1102 1017	1320 1230 1011 963 1102 1017
1410 1340 1100 940 1010 960	1410 1340 1100 940 1010 960	1310 1240 1000 940 1010 960
1501 1345 1204 923 1002 1001	1522 1352 1150 923 1002 1001	1401 1245 1104 923 1002 1001
1507 1370 1230 1100 1001 901	1537 1380 1245 1100 1001 901	1407 1270 1130 1100 1001 901

Ex.1

C:\> **fondale 5 2 3**

5,1: 1.40%
5,2: 0.52%
5,3: -4.49%
6,1: 1.99%
6,2: 0.73%
6,3: 1.22%

Ex.2

C:\> **fondale 5 2 3**

4,1: -7.09%
4,2: -7.46%
4,3: -9.09%
5,1: -6.66%
5,2: -7.43%
5,3: -8.31%
6,1: -6.64%
6,2: -7.30%

6,3: -8.13%
TECTONIC SHIFT

QUESTION 4 (Programming)

Using images taken by satellites, you can verify the presence of housing in urban areas. Suppose to have a special software that, from satellite images produces a text file containing a map NxN in which the presence of a building is encoded with the character '#', while the vacant land is described character 'o'.

Write a C program to check for new buildings. In this regard, assume that you have full availability of Roof2.map and Roof1.map, two files containing two maps of the same area obtained from images taken at 24 months one after the other. The program receives 3 integer numbers passed as command-line arguments. The first 2 numbers represent the coordinates of the upper left corner of a square of size MxM contained inside of the map. M is an integer (odd) which is passed as the third argument from the command line. Let's assume that the square of interest defined by the user is entirely contained in the map and that all buildings are separated by vacant land.

Considering the size of the maps (NxN) is known a priori defined using `#define` directive. The program must:

1. Verify the presence or absence of new buildings in the square of interest and, if so, print to the screen coordinates of the points in which arose such constructions.
2. Check if new buildings are alleged (*illegal*) extensions of existing buildings (buildings contiguous to the points in the four directions N-S-E-W to the buildings present in the first file).

Example (N=10)

Roof1.txt	Roof2.txt (ex.1)	Roof2.txt (ex.2)
oooooooo o##oooooooo oooooooo o##oooooooo ooooo#oooo o##oooooooo oooooooo o##oooooooo oooooooo o##oooooooo	oooooooo o##oooooooo oooooooo o##oooooooo ooooo#oooo o##oooooooo oooooooo o##oooooooo oooooooo oooooooo ooooo##ooo o##oooooooo	oooo##ooo o##oooooooo oooooooo o##o###ooo oooo####ooo o##o###ooo oooooooo o##oooooooo ooooo##ooo o##oooooooo

ex.1

```
C:\> building 1 5 6
```

No new construction

ex.2

```
C:\> building 1 5 6
```

```
(1,6) new construction  
(1,7) new construction  
(4,5) Alleged extension  
(4,6) Alleged extension  
(4,7) Alleged extension  
(5,5) Alleged extension  
(5,7) Alleged extension  
(6,5) Alleged extension  
(6,6) Alleged extension  
(6,7) Alleged extension
```