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QUESTION 1	*Result*

Provided the following 8bit binary number:
 1001 1111
Determine its decimal value when interpreted as:
   - Pure binary (BIN)
   - Sign and Magnitude (S&M)
   - Two's Complement (TC)
	BIN:
	
	S&M:
	
	TC:

Steps:	

QUESTION 2	
Calculate the truth table of the following function:	

$$f(x,y,z) = x \cdot \overline{y} + x \cdot y \cdot z$$

Answer:

QUESTION 3	
What is difference between the main memory (RAM) and the mass storage?	

Answer:

The dance floor of a nightclub is composed of **NUM x NUM** tiles and is illuminated by an unknown number of spotlights. A file describing the spotlights indicates the tiles they aim at. The light from a spotlight also illuminates the tiles around the one it aims at, but with less intensity: the tile that the spotlight aims at is illuminated with intensity 1; the 8 tiles immediately around it are illuminated with intensity 0.5; and then the 16 tiles circling around them are illuminated with intensity 0.2 (as depicted in the figure), the same spotlight will not illuminate further tiles.

0.2	0.2	0.2	0.2	0.2
0.2	0.5	0.5	0.5	0.2
0.2	0.5	1.0	0.5	0.2
0.2	0.5	0.5	0.5	0.2
0.2	0.2	0.2	0.2	0.2

A text file, whose name is specified by the first argument on the command line, contains a list of spotlights: each line describes a spotlight indicating the position, **ROW** and **COLUMN**, of the tile the spotlight aims at. The number of spotlights is not known a priori. The dimension of the dance floor, **NUM**, is a known constant defined by `#define NUM`. The range of **ROW** and **COLUMN** is from 0 to **NUM-1**; the tile with position (R=0, C=0) is at the top left.

The program should print out the dance floor, showing for each tile the intensity of illumination by the spotlights (the sum of the intensities of all the spotlights that illuminate it); and the coordinates of the *tiles* with maximum intensity of illumination.

Example (**NUM** =7):

File spotlights.txt contains
0 0
2 3
4 3

```
C:\>disco.exe spotlights.txt

The final condition of the dance floor:
1.0  0.7  0.4  0.2  0.2  0.2  0.0
0.5  0.7  0.7  0.5  0.5  0.2  0.0
0.2  0.6  0.9  1.2  0.7  0.4  0.0
0.0  0.4  1.0  1.0  1.0  0.4  0.0
0.0  0.4  0.7  1.2  0.7  0.4  0.0
0.0  0.2  0.5  0.5  0.5  0.2  0.0
0.0  0.2  0.2  0.2  0.2  0.2  0.0
Coordinates of the most bright tile: (4,3)
```

QUESTION 1	*Result*
Provided the following 8bit binary number: 1010 1111 Determine its decimal value when interpreted as: - Pure binary (BIN) - Sign and Magnitude (S&M) - Two's Complement (TC)	BIN: S&M: TC:

Steps:

QUESTION 2	

Calculate the truth table of the following function:
$$f(a, b, c) = a \cdot b \cdot c + \overline{b} \cdot a$$

Answer:

QUESTION 3	

What is the difference between the main memory (RAM) and the secondary memory?

Answer:

The aluminum roof is hit by a hailstorm. Each hailstone produces a maximum deformation at the point of impact, and the intensity of deformation decreases with distance. For the purpose of calculation, the roof can be considered to be composed of **NUM x NUM** squares. A file describing the hailstones contains the positions of the squares hit by the hailstones. The hailstone also cause deformation to the squares around the one it hits: The square hit by the hailstone is deformed by 1mm; the 8 squares immediately around it are deformed by 0.5mm; and the 16 squares circling around them are deformed by 0.2mm; and no further squares are influenced by the same hailstone (see the figure below).

0.2	0.2	0.2	0.2	0.2
0.2	0.5	0.5	0.5	0.2
0.2	0.5	1.0	0.5	0.2
0.2	0.5	0.5	0.5	0.2
0.2	0.2	0.2	0.2	0.2

A text file, whose name is specified as the first argument on the command line, contains a list of hailstones, with each row representing the position, **ROW** and **COLUMN,** of the square hit by the hailstone. The number of hailstones is not known a priori. The dimension of the roof, **NUM**, is a known constant defined by **#define.** The range of **ROW** and **COLUMN** is from 0 to **NUM-1**; the square with position (R=0, C=0) is at the top left.

The program should print out the final condition of the roof, reporting the deformation of each square (sum of deformation caused by all hailstones in the file), and the coordinates of the *squares* which suffer the most intense deformation by hailstones.

Example (NUM=7):

File **hailstones.txt** contains
0 0
2 3
4 3

```
C:\>hailstorm hailstones.txt

The final condition of the roof:
1.0   0.7   0.4   0.2   0.2   0.2   0.0
0.5   0.7   0.7   0.5   0.5   0.2   0.0
0.2   0.6   0.9   1.2   0.7   0.4   0.0
0.0   0.4   1.0   1.0   1.0   0.4   0.0
0.0   0.4   0.7   1.2   0.7   0.4   0.0
0.0   0.2   0.5   0.5   0.5   0.2   0.0
0.0   0.2   0.2   0.2   0.2   0.2   0.0
Coordinate of the square with most serious deformation: (4,3) (2,3)
```