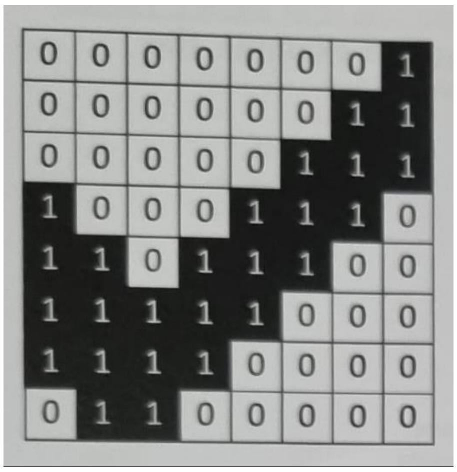
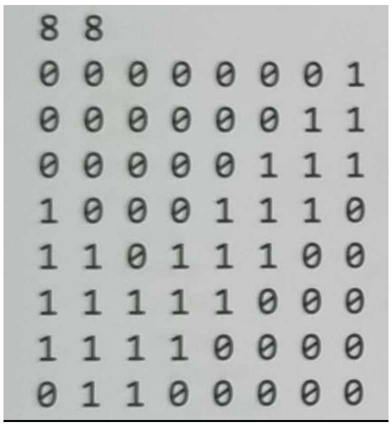
A binary image (black and white) is represented as a 2D array of booleans (or integers {0,1}) an example of a small 2D image is shown below:



0	0	0	0	0	0	0	1
0	0	0	0	0	0	1	1
0	0	0	0	0	1	1	1
1	0	0	0	1	1	1	0
1	1	0	1	1	1	0	0
1	1	1	1	1	0	0	0
1	1	1	1	0	0	0	0
0	1	1	0	0	0	0	0

The image above is already stored in the picture as the following:



```
8 8
0 0 0 0 0 0 0 1
0 0 0 0 0 0 1 1
0 0 0 0 0 1 1 1
1 0 0 0 1 1 1 0
1 1 0 1 1 1 0 0
1 1 1 1 1 0 0 0
1 1 1 1 0 0 0 0
0 1 1 0 0 0 0 0
```

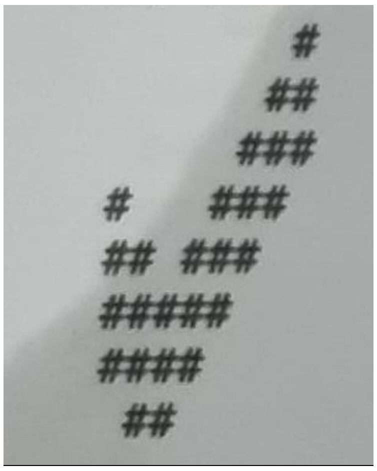
where the first value is the number of rows, the second value is the number of columns, the following values are the content of the 2D image.

Part 1:

- Write a function that takes the file name as input, then read it, save it into a 2D array/vector/list, and return it to the caller.

- Write a function that takes the 2D image as an input, along with any required metadata, then display it to the user, by printing 0 as space and printing 1 as #.

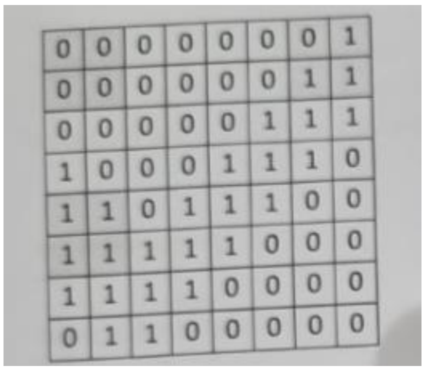
The file content should be displayed by your program as the following:



```
       #
      ##
     ###
#   ###
## ###
#####
####
 ##
```

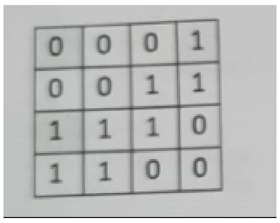
Part2:

Write a function to down-sample the 2D array by 1/2 in both the number of rows and columns; The resulting image will have 1/2 of the number of rows and 1/2 of the number of columns, every 4 values in the original image will result in 1 value in the resulting image, if at least 2 values were 1s, the resulting value will be 1, otherwise the result will be 0, for the tick example, the original 2D image is:



0	0	0	0	0	0	0	1
0	0	0	0	0	0	1	1
0	0	0	0	0	1	1	1
1	0	0	0	1	1	1	0
1	1	0	1	1	1	0	0
1	1	1	1	1	0	0	0
1	1	1	1	0	0	0	0
0	1	1	0	0	0	0	0

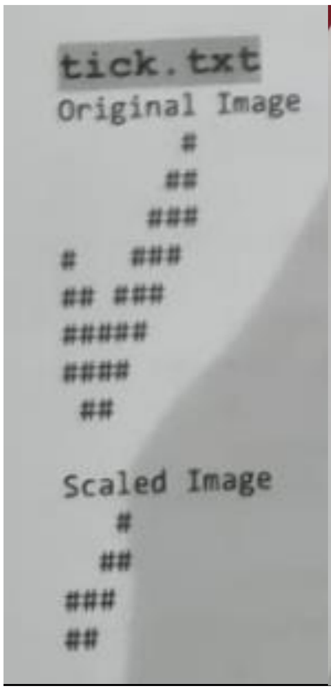
Will produce the following 2D image:



0	0	0	1
0	0	1	1
1	1	1	0
1	1	0	0

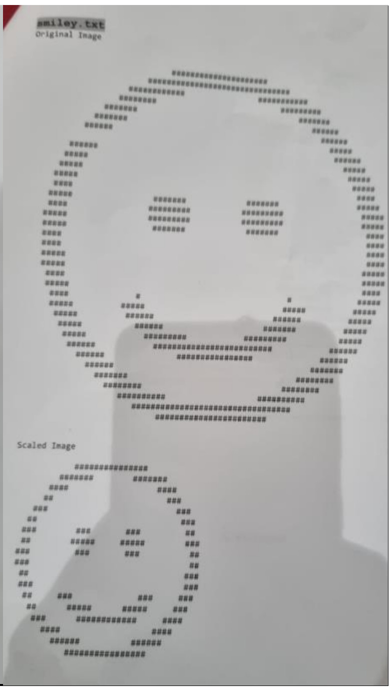
Take a look at the highlighted cells in the original and the down-sampled image.

Your final program should work with any image file regardless of the size (rows and cols), sample runs are given below for the two images (tick and smiley)



```
tick.txt
Original Image
       #
      ##
     ###
#   ###
## ###
#####
####
 ##

Scaled Image
   #
  ##
###
##
```



```
smiley.txt
Original Image
                             #####################
                        ###############################
                   ############                 ###########
                 ########                            #########
              #######                                    #######
            #######                                         ######
          ######                                              ######
                                                                #####
      ######                                                     ######
     #####                                                         #####
    #####                                                           #####
   #####                                                             #####
   ####                                                               ####
  #####                                                               #####
  ####                   #######              #######                  #####
#####                   #########            #########                 #####
#####                   #########            #########                  ####
####                     #######              #######                   ####
####                                                                    ####
#####                                                                   ####
#####                                                                  #####
 ####                                                                  #####
 #####                                                                 ####
  ####               #                                 #              #####
  #####           #####                               #####          #####
   #####           ######                          ######           #####
    #####            ######                      #######           #####
     #####             #########             #########            #####
      ######             ##########################             ######
        ######                ################                ######
          ######                                            #######
            #######                                      ########
              ########                               ########
                 ##########                     ###########
                    ###################################
                         ########################

Scaled Image
             ###############
         #######         #######
       ####                   ####
      ##                        ###
    ###                           ###
   ##                              ###
 ###         ###       ###          ##
 ##         #####     #####         ###
###          ###       ###           ##
###                                  ##
 ##                                 ###
 ###                                ###
 ##      ###              ###     ###
  ##       #####      #####      ###
   ###       ############      ####
     ####                    ####
       ######           ######
          ################
```