22437 - Industrial Vision
Lab 2: Digital Image Formation

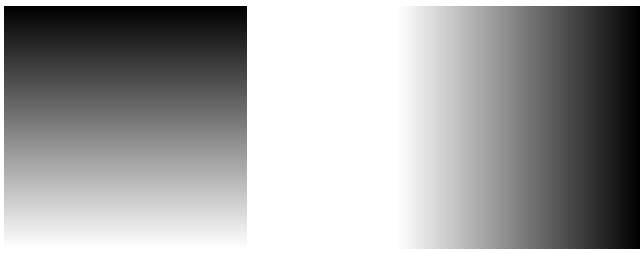
Miguel Ángel Calafat Torrens, Manuel Piñar Molina

Universitat de les Illes Balears

1. Generate the following binary images of size 256×256 and display the results:

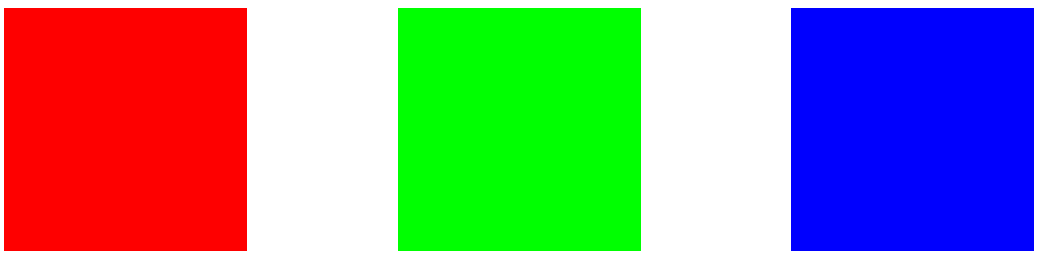
   Note: The images should be defined using the `logical` data type.

2. Generate the following grayscale images of size 256×256 and display the results:



   Note: The images data type should be `uint8`.

3. Generate the following RGB images of size 256×256 and display the results:



   Note: The images data type should be `uint8`.

4. Write a function in Matlab to generate the histogram of a grayscale image without using the specific Matlab function for this purpose. The function signature should be:

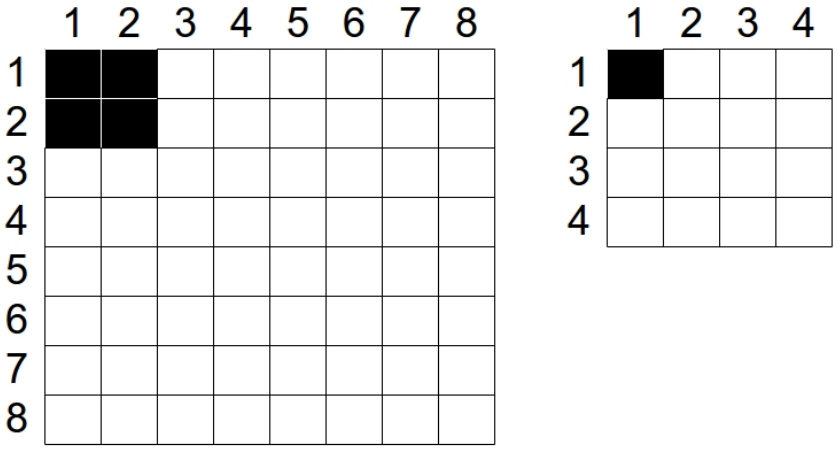
```
function h = histogram(image)
```

where h is a column vector with 256 elements of type *double* and `image` is the input grayscale image. Each component of h indicates the number of pixels of the corresponding intensity present in the image.

5. Using the function implemented in the previous point, compute the histogram of the images of the exercise 2, and plot the results. Are the histograms the same?

6. Resize the images generated in exercise 2 to 512×512, 128×128 and 64×64 using the corresponding Matlab function. Plot each resulting image and its corresponding histogram in figures. Given these histograms, what can we say about the resizing process in Matlab?

7. Write a function in Matlab to reduce images of size 256×256 to 128×128. The intensity value in the output image should be the maximum intensity in a neighborhood of the input image according to the following pattern:



The function signature should be:

```
function himage = halfsize(image)
```

where *image* is the input image (256×256) and *himage* is the output image (128×128).

8. Use the function implemented in the previous point to reduce images generated in exercise 2 and display the results.