Mechatronics Engineering and Automation Program
CSE468: Machine Vision
Project #01: Image Printing Based on Halftoning

Faculty of Engineering
**Credit Hours Engineering Program**

Q1: The following figure shows ten shades of gray approximated by dot patterns. Each gray level is represented by a 3 x 3 pattern of black and white dots. A 3 x 3 area full of black dots is the approximation to gray-level black, or 0. Similarly, a 3 x 3 area of white dots represents gray level 9, or white. The other dot patterns are approximations to gray levels in between these two extremes. A gray-level printing scheme based on dots patterns such as these is called "**Halftoning**". Note that each pixel in an input image will correspond to 3 x 3 pixels on the printed image.
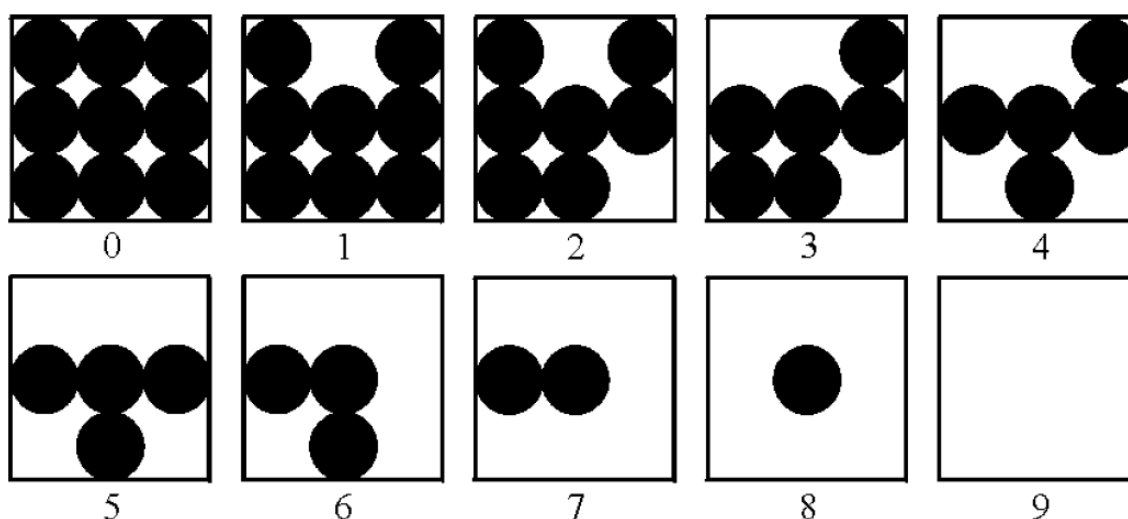
a- Write a function to decompose the intensities of the input gray scale image into 10 gray levels only to make it suitable for the printing process.

b- Write a function to find the resolution of the printed image (assume H x W). The arguments of this function will be: a) the dimensions in cm/inch of the printed image and b) the image quality (dpi).). After computing H and W, your program carries out the operations: H=3*round(H/3) and W=3*round(W/3) to make sure that the resulting height and width divisible by 3.
round to the nearest divisible number by 3

c- Write a function to scale the input image to h x w where h=H/3 and w=W/3.

d- Write a computer program for halftoning: the input will be the gray-scale image (resulting from step (c)); process will map the image intensity to the dot patterns as discussed above.

e- Test your program using 10 images at least. You must write a neat report as described in the *project_00* file.

Q2: Write a function to make the **Color Halftoning** process, describe this function, and test it on 10 images.