Benha University **Faculty of Engineering (at Shoubra)** **Electrical Engineering Department** **(**Computer Systems Engineering**)** **Subject: Image Processing – ECE 441C** **4th Year**		**Midterm Exam** **Date:** Tuesday 15/11/2016 **Duration:** 1 hour **№ of Questions:** 4 in 3 pages **Total Marks:** 20
Attempt **all** the following questions:		

Name: ……...

Question 1: Choose the best answer: (6 Marks)

Question	1	2	3	4	5	6	7	8	9	10	11	12
Answer												

1. Smallest value of gamma will produce
   a. contrast
   b. darker image
   c. brighter image
   d. black and white image
2. Spatial domain is denoted by
   a. g(x,y) = [f(x,y)]
   b. g(x,y) = T[f(x)]
   c. g(x,y) = T[f(x,y)]
   d. g(x,y) = T[f(y)]
3. Which one is not process of image processing
   a. high level
   b. low level
   c. last level;
   d. mid level
4. Smallest possible neighbor hood in a image must be of size
   a. 3x3 b. 2x2 c. 1x1 d. 4x4
5. Smoothing spatial filters are useful for
   a. image enhancement
   b. image restoration
   c. highlight gross details
   d. highlight fine details
6. In ……. filters, there is no difference between correlation & convolution
   a. symmetric
   b. equal
   c. asymmetric
   d. simple
7. The …… of an image shows us the distribution of grey levels in the image.
   a. histogram
   b. contrast Stretching
   c. histogram equalization
   d. transformation function
8. Image processing defined as a discipline in which ……..
   a. The input of a process is an image description and the output is image
   b. Both the input and output of a process are images.
   c. Both the input and output of a process are descriptions.
   d. The input of a process is an image and the output is an image description.
9. In the formula g(x,y) = T[f(x,y)], T is the
   a. transformed image
   b. transformation function
   c. transformation theorem
   d. transformation vector

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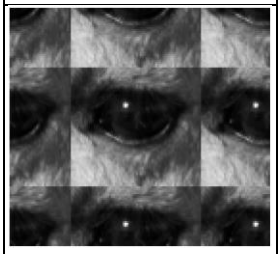
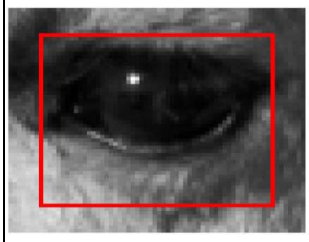
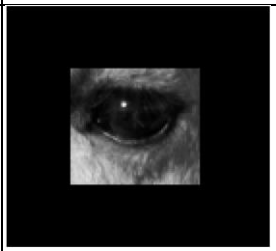
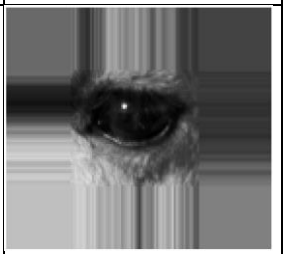
10. In bit plane slicing the most of the information of an image is contained by
    a. mid order plane
    b. highest order plane
    c. lowest order plane
    d. all planes
11. Negative of the image having intensity values [0,L-1] is expressed by
    a. s = L-1 b. s = 1-r c. s = L-1-r d. s = L-r
12. Log transformation is given by the formula
    a. s = c log(r) b. s = c log(1+r) c. s = c log(2+r) d. s = log(1+r)

Question 2: Complete the following sentences: (6 Marks)

1. …… is the operation of taking a corrupt/noisy image and estimating the clean, original image**.**
2. …… deals with tools for extracting image components that are useful in the representation and description of shape**.**
3. Partition an image into its constituent parts or objects is called ……**.**
4. …… is the process of assigns a label to an object based on its descriptors.
5. Image processing techniques are used extensively by law enforcers in many applications such as …… and ……**.**
6. There are many possible filter parameters such as …… and ……**.**
7. There are two broad categories of image enhancement techniques which are …… and ……**.**
8. …… plots how many times (frequency) each intensity value in image occurs**.**
9. ……... are useful for enhancing white or grey detail embedded in dark regions of an image**.**
10. Second derivative of I(x) has …… at edge**.**
11. What to do at image boundaries?

			
(a) ……..	(b) ……..	(c) ……..	(d) ……..

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Question 3: (4 Marks)

a. **(3 marks)** Consider the image shown below; compute the equalized image with eight possible gray levels. Show each step carefully. Draw the histograms of the original and equalized images.

b. **(1 mark)** What's your opinion about the output image.

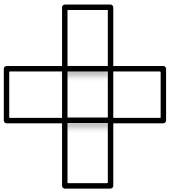
1	2	1	1	2	0
0	1	0	1	0	1
1	6	7	6	1	2

Question 4: (4 Marks)

a. **(2 marks)** A 4x4 image is given by

255	112	22	102
80	90	10	112
98	75	20	119
200	100	9	105

Filter the image using a median filter (padding with zeros), where the filter mask is given by:



b. **(2 marks)** In a given application an averaging mask is applied to input image to reduce noise, and then a Laplacian mask is applied to enhance small details. Would the result be the same if the order of these operations were reversed?

Good Luck
Dr. Shady Yehia Elmashad