

Name: _____

Student Number: _____

MCMaster UNIVERSITY MIDTERM EXAMINATION
PART II

CompEng 4TN4: Image Processing

Instructor: Dr. Xiaolin Wu

Date: February 25, 2015

Duration: 45 Minutes

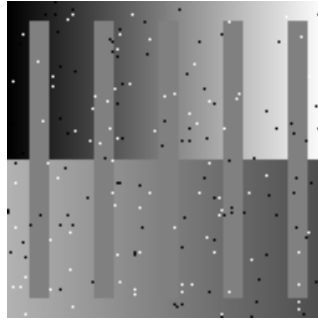
Note:

1. This is an open book exam. You can use the textbooks, lecture notes and other written materials.
2. You can use a calculator. However, laptops and cell phones are not allowed.
3. Answer the questions in the spaces provided on the question sheets. If you run out of room for an answer, continue on the back of the page.
4. This exam has 5 pages, including 5 questions for a total of 68 points. You are responsible for ensuring that your copy of the test is complete.
5. Answer all questions and good luck!

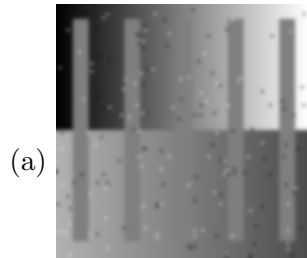
For instructor's use:

Question:	1	2	3	4	5	Total
Points:	12	16	10	20	10	68
Score:						

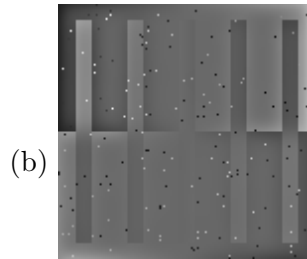
[12] 1. Given an input image as follows.



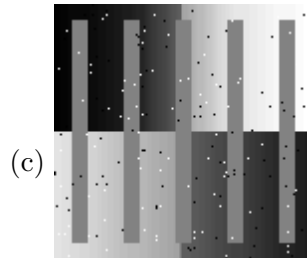
Which one of the listed image processing techniques is likely used to generate each of the following output images?



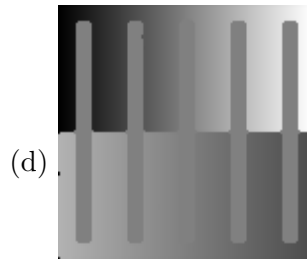
A. Histogram equalization



B. Gaussian lowpass filtering

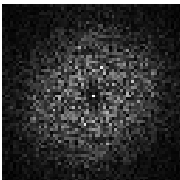
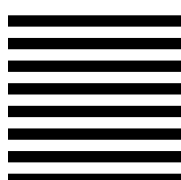
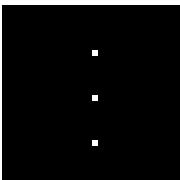
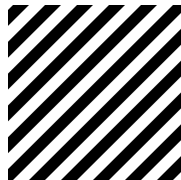
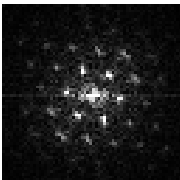
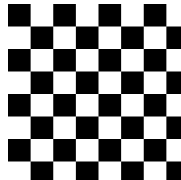
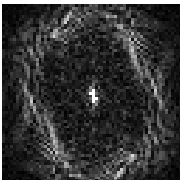
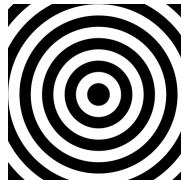
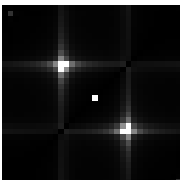
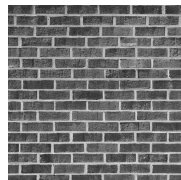
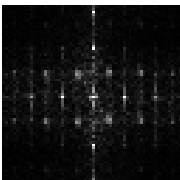

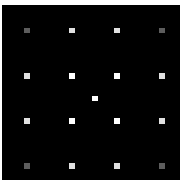

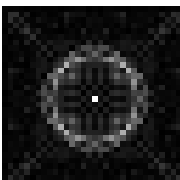



C. Median filtering



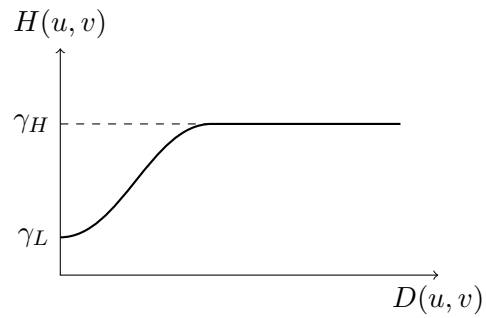
D. Homomorphic filtering

[16] 2. Pair the following frequency domain images with their corresponding temporal domain images.

(a)		A.	
(b)		B.	
(c)		C.	
(d)		D.	
(e)		E.	
(f)		F.	
(g)		G.	
(h)		H.	

[10] 3. If you want to sharpen an image in frequency domain, what type of filters do you use? Give an example of such a filter.

[20] 4. Use the transfer function of a Butterworth high-pass filter of order n to construct a homomorphic filter. Your filter must exhibit the characteristic shape shown in the following figure and must include the parameters shown in that figure.



- [10] 5. How to detect and reduce periodic noise in the input image (left) in order to get a cleaner output image (right)?

