

## 博士班基本學科考試：數位影像處理

2010 年 10 月 1 日

1. (20%)

The following small image has gray values in the range 0-19. Compute the gray level histogram and the mapping that will equalize this histogram. Produce the  $8 \times 8$  grid containing the gray values for the new histogram-equalized image.

16	9	13	13	16	19	19	17
12	10	14	15	18	18	16	14
11	8	10	12	14	13	14	15
8	6	3	7	9	11	12	12
12	6	5	13	14	14	16	15
11	10	8	5	8	11	14	14
9	8	3	4	7	12	18	19
10	7	4	2	10	12	13	17

2. (20%)

(a) What is fovea? Please draw a picture to illustrate your explanation.

(b) What is 2-D ideal bandreject filter? Please write down its mathematical expression.

3. (20%)

Consider the morphological operations for binary images. Please prove the validity of the duality expression for dilation and erosion, i.e.,  $(A \oplus B)^c = (A^c \ominus \hat{B})$ .

4. (20%)

What is a panoramic image? How can you obtain a panoramic image with the regular commercially available cameras? Describe the methods or algorithms those you know.

5. (20%)

(a) What is the inverse filter?

(b) What is the Wiener filter? (Please write down the mathematical expression.)

(c) When does the Wiener filter reduce to the inverse filter?