Chapter 5: Image Restoration

Malware37

1.

In Fig 1.1, *** is representing the last three digits of your ID (e.g. for be 001).

***	40	60	80	100
***	40	60	80	100
***	40	60	80	100
***	40	60	80	100
***	40	60	80	100

Fig 1.1 A 7-bit input image

b) Assume that, we applied a lossy compression technique to Fig 1.1. After the compression, we decompressed the image in which all the pixel intensity values are increased by two (2) [For example – 40 becomes 42, 60 becomes 62]. Find the Root Mean Square Error and Signal-to-Noise Ratio of the decompressed image. **[4]**

Solution: 024

*** = 24

f(x, y)				
24	40	60	80	100
24	40	60	80	100
24	40	60	80	100
24	40	60	80	100
24	40	60	80	100

f'(x, y)				
26	42	62	82	102
26	42	62	82	102
26	42	62	82	102
26	42	62	82	102
26	42	62	82	102

Total 25 pixel values. Each pixel value is increased by 2.

Row=M=5, Column=N=5

$$e_{\text{rms}} = \left[\frac{1}{MN} \sum_{x=0}^{M-1-} \sum_{y=0}^{N-1} \left[\hat{f}(x,y) - f(x,y) \right]^2 \right]^{1/2}$$

Erms = sqrt((1/25) x (2^2) x 25) = 2

$$\text{SNR}_{\text{ms}} = \frac{\sum_{x=0}^{M-1} \sum_{y=0}^{N-1} \hat{f}(x,y)^2}{\sum_{x=0}^{M-1} \sum_{y=0}^{N-1} \left[\hat{f}(x,y) - f(x,y) \right]^2}$$

SNR = ((26^2 + 42^2 + 62^2 + 82^2 + 102^2) x 5) / (2^2 x 25) = 1170.6