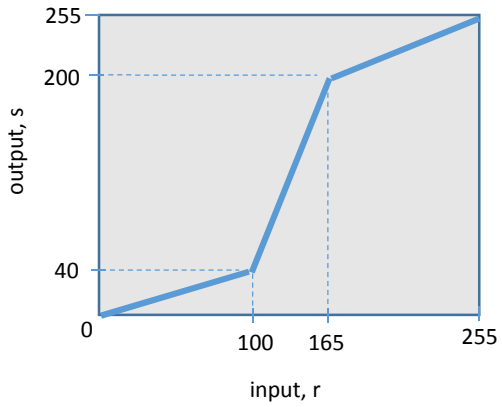
TDS3651 Visual Information Processing
Trimester 2, 2016/2017

Problem Set 1 (5%)
Out: 7 Dec (Wed)
Due: 13 Dec (Tues) 11:59PM

Please submit your answers to these problems through MMLS. Softcopy submission only. Implementation/experiments can be used to support or verify the answers to some questions, if necessary. Late-Days policy applies.

1. Given the piecewise linear transformation function T below that transforms input pixel *r(x,y)* to output pixel *s(x,y).*

[10 marks]



(a) What is the equation for the transformation function above? (Give in $s = T(r)$ form)
(b) If the transformation function T is applied to the following 3x3 image patch, what are the values of the output image patch?

108	190	255
44	82	249
125	163	0

(c) Analyse the overall effect of applying this function to an image.

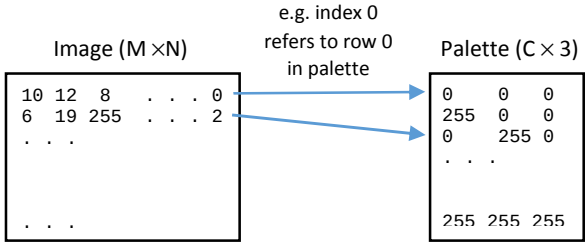
2. Given the following 3-bit image, perform histogram equalization on it.

0	3	2	6	1
6	4	7	6	1
5	6	1	7	5
1	4	0	7	6
1	6	2	1	5

[10 marks]

(a) What is the resulting output image after histogram equalization is applied?
(b) Comment on the histograms before and after equalization.
(c) Will the image pixel values change further if histogram equalization is applied over and over again? Justify your answer.

3. Indexed colour is a representation technique that encodes an image by storing colour information in a separate piece of data called a **palette**, an array of colour elements like a "lookup table". Hence, image pixels do not need the full colour specification (3 channels – R, G, B), but only the *index* in the *palette.* An example of a format that supports indexed colour is Portable Network Graphics or PNG.



Assuming we use only 256 colours (C=256) on the indexed colour technique to represent an image, how many times of storage space can we save as compared to the standard full colour RGB format?

[5 marks]

End of Problem Set