Image Analysis

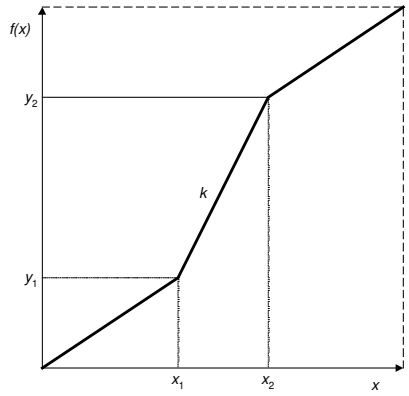
Exercise 2

18.9.2003

1. Perform bilinear interpolation 2×2 → 5×5 when the values of the original block are:
   1. line: (0, 16)
   2. line: (16, 0)

2. Prove that the Equation (2.1) in Lecture Notes is correct.

3. Let us define contrast stretching with the three parameters (x_1, x_2 k) so that the points x_1 and x_2 defines the area in which the gray scales are stretched, and k the factor for the linear function $f(x)$ of the same area. In the other parts ($x<x_1$ or $x>x_2$) the factor must be set so that the values go through 0 to 1. Give equations for calculating y_1 and y_2 and define the transform as a three-part function ($x<x_1$, $x_1 \leq x \leq x_2$, $x_2<x$) using these.



4. Perform histogram equalization for the following:

x:	0	1	2	3	4	5	6	7	8	9
#x:	5	4	3	2	1	1	2	3	4	5

5. Perform *smoothing* for the following image samples. What happens if the operation is iteratively repeated for the image?

10	10	10	10	10
10	10	10	10	10
10	**20**	**20**	**20**	10
10	10	10	10	10
10	10	10	10	10

10	10	10	10	**20**
10	10	10	**20**	10
10	10	**20**	10	10
10	**20**	10	10	10
20	10	10	10	10

10	10	10	10	10
10	**11**	**11**	**11**	10
10	**11**	**20**	**11**	10
10	**11**	**11**	**11**	10
10	10	10	10	10