

Question 1:

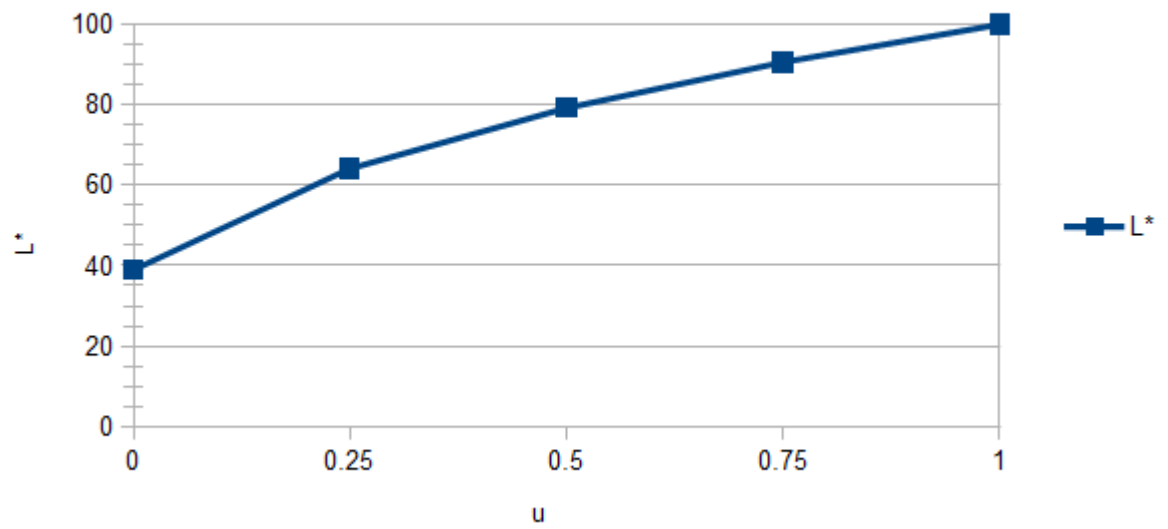
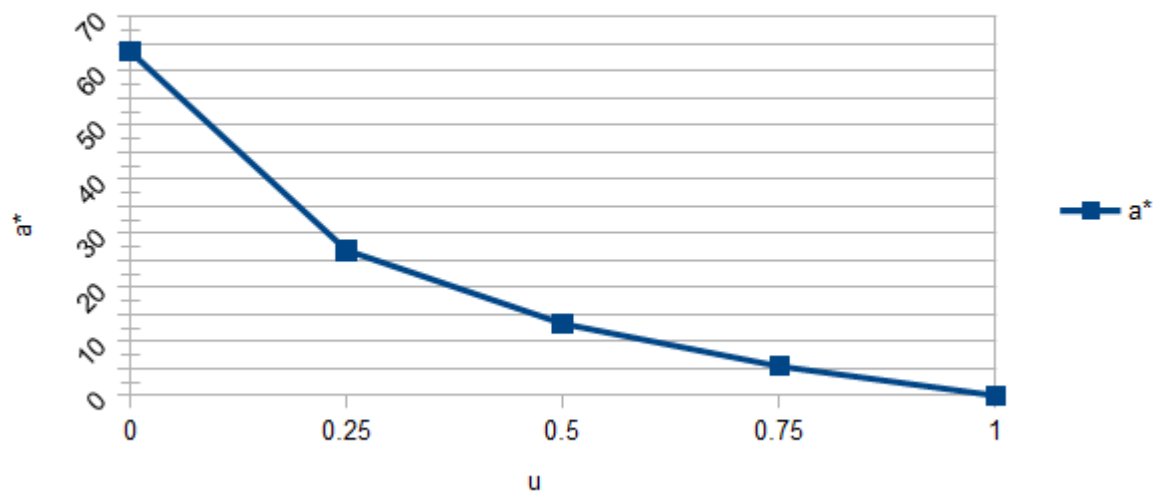
To make a perceptually uniform intensity system with intensities $l_1 = 1, l_2, l_3, l_4, l_5 = 256$:

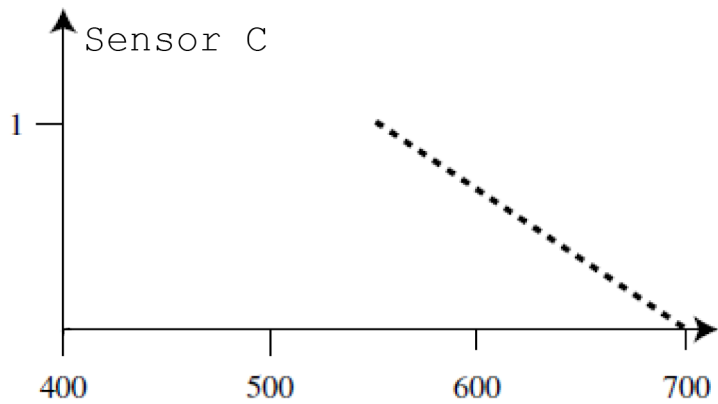
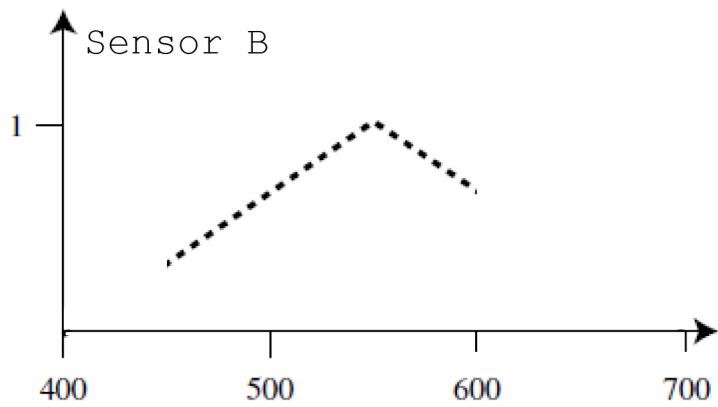
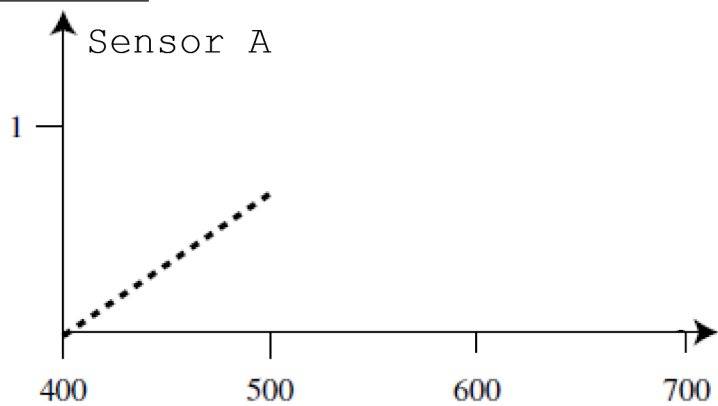
$$l_2 = 4, l_3 = 16, l_4 = 64$$

Question 2:

	RGB	XYZ	L*a*b*
a.	(0.5, 0, 0) (1, 1, 1)	(0.2062, 0.1063, 0.00965) (0.9505, 0.9998, 1.089)	(38.95, 63.59, 53.35) (99.99, 0.04123, -0.02846)
	u	RGB	
	0	(0.5, 0, 0)	
	0.25	(0.625, 0.25, 0.25)	
b.	0.5	(0.75, 0.5, 0.5)	
	0.75	(0.875, 0.75, 0.75)	
	1	(1, 1, 1)	
	u	XYZ	L*a*b*
	0	(0.2062, 0.1063, 0.00965)	(38.95, 63.59, 53.35)
	0.25	(0.3923, 0.3297, 0.2795)	(64.13, 26.86, 11.05)
c.	0.5	(0.5784, 0.5531, 0.5493)	(79.22, 13.28, 4.947)
	0.75	(0.7644, 0.7764, 0.8192)	(90.62, 5.430, 1.917)
	1	(0.9505, 0.9998, 1.089)	(99.99, 0.04123, -0.02846)

d.

 L^* as a function of u  a^* as a function of u 

Question 3:

Question 4:

$$\text{a. } \begin{bmatrix} 0 & 0 & 0 & 0 \\ -4 & -4 & -4 & -4 \\ -4 & -4 & -4 & -4 \\ 0 & 0 & 0 & 0 \end{bmatrix} \quad \text{b. } \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix} \quad \text{c. } \begin{bmatrix} 1 & 0 & -1 \\ 2 & 0 & -2 \\ 1 & 0 & -1 \end{bmatrix}$$

Question 5:

1d filter mask = $[a_0, a_1, \dots, a_{i-1}]$ s.t. $a_j = C_j^{i-1}$

1d filtermask for 9:

$m = [1, 8, 28, 56, 70, 56, 28, 8, 1]$

9x9 filtermask: $= M_{ij} = m[i] * m[j]$

$$\begin{bmatrix} 1 & 8 & 28 & 56 & 70 & 56 & 28 & 8 & 1 \\ 8 & 64 & 224 & 448 & 560 & 448 & 224 & 64 & 8 \\ 28 & 224 & 784 & 1568 & 1960 & 1568 & 784 & 224 & 28 \\ 56 & 448 & 1568 & 3136 & 3920 & 3136 & 1568 & 448 & 56 \\ 70 & 560 & 1960 & 3920 & 4900 & 3920 & 1960 & 560 & 70 \\ 56 & 448 & 1568 & 3136 & 3920 & 3136 & 1568 & 448 & 56 \\ 28 & 224 & 784 & 1568 & 1960 & 1568 & 784 & 224 & 28 \\ 8 & 64 & 224 & 448 & 560 & 448 & 224 & 64 & 8 \\ 1 & 8 & 28 & 56 & 70 & 56 & 28 & 8 & 1 \end{bmatrix}$$