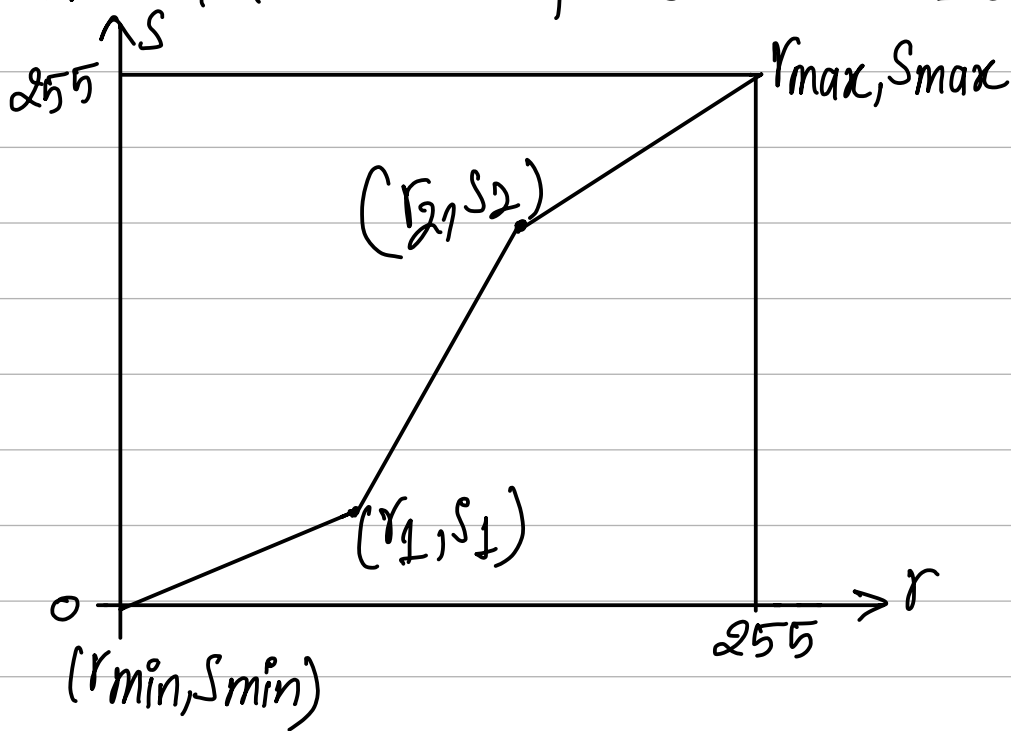


# Contrast Stretching

Question-01: Perform contrast stretching on the given image

$$A = \begin{bmatrix} 7 & 7 & 8 & 8 \\ 6 & 4 & 5 & 9 \\ 8 & 7 & 6 & 9 \\ 6 & 6 & 4 & 7 \end{bmatrix}$$

Solution: We know for contrast stretching



$$\text{stretched intensity}(s) = (r - r_1) \frac{r_{\max} - r_{\min}}{(r_2 - r_1)} + r_{\min}$$

From given image,  $r_1 = 4$  and  $r_2 = 9$   
also, for 4-bit image,  $r_{\min} = 0$  and  $r_{\max} = 15$

now, streatching available intensities;

$$S_4 = (4-4) \left( \frac{15-0}{9-4} \right) + 0 = 0$$

$$S_5 = (5-4) \left( \frac{15-0}{9-4} \right) + 0 = 3$$

$$S_6 = (6-4) \left( \frac{15-0}{9-4} \right) + 0 = 6$$

$$S_7 = (7-4) \left( \frac{15-0}{9-4} \right) + 0 = 9$$

$$S_8 = (8-4) \left( \frac{15-0}{9-4} \right) + 0 = 12$$

$$S_9 = (9-4) \left( \frac{15-0}{9-4} \right) + 0 = 15$$

Enhanced image after histogram streatching we get,

$$A_{\text{enhanced}} = \begin{bmatrix} 9 & 9 & 12 & 12 \\ 6 & 0 & 3 & 15 \\ 12 & 9 & 6 & 15 \\ 6 & 6 & 0 & 9 \end{bmatrix}$$

//