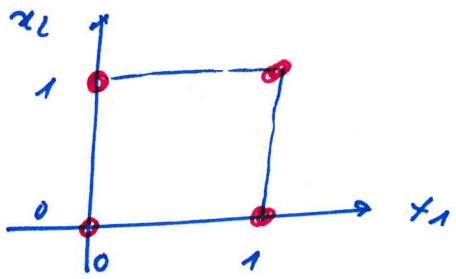
# How to model the corners of a square as an ELC condition?

Consider the unit square:




The equations that describe the square are:

$$0 \leq x_1 \leq 1 \quad \text{and} \quad 0 \leq x_2 \leq 1$$

Which ELC condition should we now impose to describe the 4 corner points?

The coordinates of the corner points are:

$$\begin{pmatrix} x_1 = 0 \\ \text{and } x_2 = 0 \end{pmatrix} \text{ or } \begin{pmatrix} x_1 = 0 \\ \text{and } x_2 = 1 \end{pmatrix} \text{ or } \begin{pmatrix} x_1 = 1 \\ \text{and } x_2 = 0 \end{pmatrix} \text{ or } \begin{pmatrix} x_1 = 1 \text{ and} \\ x_2 = 1 \end{pmatrix}$$

To construct the ELC condition we rewrite this or-of-and expression as an and-of-or expression:

$$(x_1 = 0 \ \underline{\text{or}} \ x_1 = 1) \ \underline{\text{and}} \ (x_2 = 0 \ \underline{\text{or}} \ x_2 = 1)$$

So we now see that in the group $0 \leq x_1, x_1 \leq 1$ we should have 1 inequality holding with equality and the same holds for the group $0 \leq x_2, x_2 \leq 1$

So we get

$$\left.\begin{aligned} 0 &\leq x_1 && (1) \\ 0 &\leq 1 - x_1 && (2) \end{aligned}\right\} \quad \varphi_1 = \{1, 2\}$$

$$\left.\begin{aligned} 0 &\leq x_2 && (3) \\ 0 &\leq 1 - x_2 && (4) \end{aligned}\right\} \quad \varphi_2 = \{3, 4\}$$

$$x_1(1 - x_1) + x_2(1 - x_2) = 0$$

as ELC condition.