2D Filter Mask Difference Equation Tutorial Exercise 1

The digital filter given in Figure 1, is described by the Equation:

$$y(n_1, n_2) + ay(n_1 - 1, n_2 - 1) + by(n_1, n_2 - 1) + cy(n_1 + 1, n_2 - 1) = x(n_1, n_2)$$

- Define all possible recursions allowed by this mask.

- Define the domain of the filter impulse response.
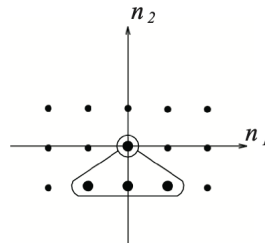
- Define a set of initial conditions to ensure that the system is recursive, linear and shift invariant.

Figure 1: Figure of Exercise.