Definition (Discrete-time linear systems). A discrete-time linear time-invariant proper open system is defined by three matrices A, B, C. Together they give a recurrence of the type

$$\begin{aligned} x_{k+1} &= \mathbf{A}x_k + \mathbf{B}u_k \\ y_k &= \mathbf{C}x_k \end{aligned}$$

If x has dimension $n \geq 1$, u dimension $m \geq 1$ and y dimension $p \geq 1$, then A has dimension $n \times n$, B has dimension $n \times m$, C has dimension $p \times n$.