Definition of a Difference Equation

A sequence is a function whose domain is the set of integers. Let $\{Y_k\}$ represent the sequence and Y_k be a member of the sequence. Now we need a rule to transform integers into Y_k. Suppose this rule took on the form of the function $Y_{k+n} = F (k, Y_{k+n-1}, Y_{k+n-2}, \ldots, Y_k)$. F is a well-defined function that gives the element in the sequence, Y_{k+n}, from the preceding elements, such as Y_{k+n-1} and so fourth, which vary with the value of k. This forms a generalized difference equation of order n.