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44720. *The $3x + 1$ Problem and Directed Graphs.*

Define the Collatz mapping $T(x)$ on the positive odd integers as follows: $T(x) = (3x + 1)/2$ if x is a positive odd integer, and $T(x) = x/2$ if x is a positive even integer. The famous and notorious $3x + 1$ (Collatz) problem states that for any positive integer x , there exists some positive integer k satisfying $T^k(x) = 1$, where T^k denotes k compositions of the function T . In this presentation, two equivalent formulations of the $3x + 1$ problem are given in terms of weak connectivity of directed graphs whose vertex sets are subsets of the positive odd integers. Connectivity of vertices is defined using a function induced by the Collatz mapping. Conditions under which certain vertices are connected by directed edges are also given. (Received September 15, 2000)