1154-11-1093 **Max Alekseyev*** (`maxal@gwu.edu`) and **Neil Sloane** (`njasloane@gmail.com`). *Combinatorics of Kaprekar's Junction Numbers.* Preliminary report.

A base b junction number u has the property that there are at least two ways to write it as $u = v + s(v)$, where $s(v)$ is the sum of the digits in the expansion of the number v in base b. For the base 10 case, Kaprekar in the 1950's and 1960's studied the problem of finding $K(n)$, the smallest u such that the equation $u = v + s(v)$ has exactly n solutions. He gave the values $K(2) = 101$, $K(3) = 10^{13} + 1$, and conjectured that $K(4) = 10^{24} + 102$. In 1966 Narasinga Rao gave the upper bound $10^{1111111111124} + 102$ for $K(5)$, as well as upper bounds for $K(6)$, $K(7)$, $K(8)$, and $K(16)$. We will present a set of recurrences which determine $K(n)$ for any base b, and in particular we will show that these conjectured values of $K(n)$ are correct. Rather surprisingly, the solution to the base 2 problem is determined by the classical Thue-Morse sequence. For fixed b, it appears that $K(n)$ grows as a tower of height about $\log_2(n)$. (Received September 13, 2019)