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Design and Analysis of Algorithms

Introduction to Divide & Conquer, Master Theorem

1. $T(n) = 2 * T(n / 2) + 1, n = 2^k$
   $T(1) = 0$
   $T(2) = 2(0) + 1 = 1$
   $T(4) = 2(1) + 1 = 3$
   $T(8) = 2(3) + 1 = 7$
   …
   $T(n) = n – 1$
   If $n = 2^k$, then: $T(2^k) = 2*T(2^{k-1}) + 1 = 2((2^{k-1} – 1) + 1 = 2^k – 1 = n – 1$.

2. Starting at $i = 0$, increment i repeatedly until the value stored at position 2^i is ∞. Once you've found this position "m", search the newly formed finite array (from 0 to m) using a binary search to find x.