NUMBER THEORY REVIEW:

1. A basic property of numbers in any base b ≥ 2: The sum of any three single-digit numbers is at most two digits long.
2. How many digits (k) are needed to represent the number N ≥ 0 in base b? With k digits in base b, there are numbers {N | bk-1 ≤ N < bk and N has k number of digits}
3. Design an algorithm to find the number k of binary digits in the binary representation of a positive decimal integer n.

Analysis:

Since 2k-1 ≤ n < 2k ,

then log2 2k-1≤ log2 n < log2 2k (log2 2k-1 = k-1)

k-1 ≤ log2 n < k

k-1 ≤ └ log2 n ┘ < k

k ≤ └ log2 n ┘ + 1 < k + 1