1. We release \( k \) bees in a room with \( n \) flowers. Each bee decides to go to some random flower. Multiple bees can land on the same flower. How many flowers do we expect to see bees land on? Does your solution confirm the intuitive answer for the special case where there is only one flower? Or what if there’s only one bee? If we release 400 bees and there are 100 flowers, what’s the answer?

2. In Quicksort, we recursively pick pivots to partition our data set. Given \( n \) elements, a pivot is \textit{balanced} if each side of the partition ends up with at least a constant fraction \( \frac{1}{c} \cdot n \) of the input. Otherwise, a pivot is called \textit{unbalanced}. In both cases, the partition takes \( dn \) time.
   As we run Quicksort, suppose that every balanced pivot is followed by \( u \) unbalanced pivots, where \( u \) is a constant.
   a) Show this under the above conditions, the algorithm will take \( O(n \log n) \) time.
   b) Show roughly what the effect of \( u, d \) and \( c \) is on the upper bound for the runtime. In other words, where are they to be found, as hidden constants in the \( O \)-notation?
   As always for upper bounds, exaggerate and simplify.