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Question 1:

- The main idea to solve this problem:
    - Binary search technique to reduce the size of the problem in logarithm scale.
    - Greedy method to go through all letters from snake's DNA to determine whether there is exist that venom's level k.
- First, count numbers n_s, n_n, n_a, n_k, n_e of occurrences of each letter S, N, A, K, E in the original sequence and let $M = \min\{n_s, n_n, n_a, n_k, n_e\}$.
- Then:
    - Loop through every single letter in the DNA, and try to delete zero or more letters from the DNA so that it satisfies the pattern as following:
        - Begin with M copies of the letter S
        - Then has M copies of the letter N
        - Then has M copies of letter A
        - Then has M copies of letter K
        - Then has M copies of letter E.
    - After we finish looping the whole DNA, if it satisfies the pattern above, we are done. This is the maximum venom level of this snake.
    - Else, at this point we will use binary search with $start = 0$ and $end = M$
        - Let's us define $maximumVenom$ is the variable to hold the DNA with venom level k, $0 < k < M$.
        - Take the middle point between $start$ and end, $mid = \left\lfloor \frac{(start+end)}{2} \right\rfloor$ $(*)$
        - mid represents the level of venom we try to check using greedy method (loop through single letter in the original DNA, and try to delete zero or more letters from the DNA so that it satisfies the pattern for venom level mid) whether the snake has venom level mid.
            - If yes, we update $start = mid + 1$ and store the DNA that has venom level mid into $maximumVenom$ variable.
            - If no, we update $end = mid - 1$
            - And repeat from step $(*)$ until $start > end$, then we break the loop.
    - If $maximumVenom$ is empty, the snake has venom level 0.
    - If $maximumVenom$ is not empty, this is the maximum venom level that the snake can have.
        - Because every time we store the result in the $maximumVenom$, it is the maximum level so far and after that, we try find the potential higher level in the right half of the binary search.
    - Overall, at each level we loop through the original DNA try to delete zeros or more letters to fit the format at a specific level of venom, it takes $O(n)$
    - Using binary search technique, number of levels we need to do is $\log(n)$, so it takes $O(logn)$.
    - Therefore, the time complexity for this algorithm is $O(nlogn)$.