CS225 Homework 1

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1. **Our Solution:**

   We suppose the list L has members: $length$ denoting the length of the list, or number of elements in the list; $data[i]$ denoting the i-th element of the list. Assuming the index starts from 1.

   Therefore, just cut down the length of l to disable elements after the i-th in the list and w obtain $L.length := L.length - k$, so the elements $data[i+1, i+2, \cdots, length]$ will be "ignored", or deleted.

   Since this only requires one instruction thus the complexity has nothing to do with k, the answer should be $\Theta(1)$.

2. (a) **Our Solution:**

   When function $g : T' \times T' \to T'$ satisfies a rule similar to "Law of Association". Denoting a list as t, of which the i-th element is t_i, the sublist containing a-th to b-th element is $t_{a..b}$. The condition is that for every k_1, k_2 satisfying $a < k_1, k_2 < b$, we have $g(t_{a..k_1}, t_{k_1+1..b}) = g(t_{a..k_2}, t_{k_2+1..b})$.

   The reason for this requirement is, any list l with more than three elements can be divided into two lists in $n-1$ ways, where n is the length of the list l. Assuming $g(t_{a..k_1}, t_{k_1+1..b}) \neq g(t_{a..k_2}, t_{k_2+1..b})$, we find if the division happens at the k-th element, i.e. dividing the list into $t_{a..k}$ and $t_{k+1..b}$, the result depends on the value of k, which is against definity.

   (b) **Our Solution:**

   Solution to 2(ii)

   (c) **Our Solution:**

   Solution to 2(iii)

3. **Our Solution:**

4. **Our Solution:**