CSE 321: Algorithms
Solutions for Homework 4

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1. The function "findBestRoute" finds the optimal penalties to reach each hotel. Optimal means finding minimum penalty. Assigns minimum penalty for reaching each ith hotel to $OPT[i]$ from the beginning 0 point.

   Computing $OPT[0], OPT[1], ..., OPT[n]$ is takes approximately $\frac{n(n+1)}{2}$ time.

   To determine the hotels that should be stopped at is assigning the list $PATH$ when computing OPT. Therefore 2 comes as a coefficient to the above complexity:
   $2\frac{n(n+1)}{2} = n(n+1)$

   So the algorithm takes $\mathcal{O}(n^2)$ time in total.

2. The function "reconstructDocument" determine if ith character is **a valid word or composed valid words** and assign such indices to a boolean list named $VALID$.

   Every element of $VALID$ list points each character of string in order. Initialize all the elements as False.

   Firstly start to find first valid word. If there is a valid word in string then keep going the algorithm. Keep the finish index of first valid word as "startIndex". Assign VALID[startIndex]=True.

   Then algorithm reduce computing $VALID[i]$ problem to a sub problem $VALID[j] \wedge dict[j:i]$ for each i. $(0 \leq j \leq i \leq n)$

   Therefore, we only execute "dict" functions when $VALID[j] =$ True.

   So the algorithm takes at most $\mathcal{O}(n^2)$ time.

3. ?

4. ?

5. First calculate equal elements and set a distinct number to each equal distinct elements. Increment the number for each distinct equalities. Then compare new prepared list if

any given two inequal elements has same value of new list.

It doesn't matter what is the assigned value. We only care about if inequality constraints can satisfy or not.

Let n: number of elements of given lists.
Let k: number of given equality constraints.
Let m: number of given equality constraints.

Algorithm takes at most $\mathcal{O}(m + k)$ time.